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Twenty-Seventh Annual Report

of the

State Board of Health

of the

STATE OF OHIO

For the Year Ending December 31

1912



COLUMBUS, OHIO:
THE F. J. HEER PRINTING CO.
1913

LETTER OF TRANSMITTAL.

OHIO STATE BOARD OF HEALTH,
OFFICE OF THE SECRETARY.

COLUMBUS, February 10th. 1913.

To His Excellency, JAMES M. COX, Governor of Ohio,

SIR:—In accordance with Section 1248 of the General Code, the accompanying report, which is for the calendar year 1912, is herewith submitted for your consideration and for publication.

Respectfully,

E. F. McCAMPBELL, PH. D., M. D.,
Secretary.

MEMBERS OF THE OHIO STATE BOARD OF HEALTH.

FRANK WARNER, M. D., President, Columbus.....	1912
OSCAR HASENCAMP, M. D., Vice-President, Toledo.....	1913
JOSIAH HARTZELL, Ph. D., Canton.....	1914
R. H. GRUBE, M. D., Xenia.....	1915
JOHN W. HILL, C. E., Cincinnati.....	1916
H. T. SUTTON, M. D., Zanesville.....	1917
WM. T. MILLER, M. D., Cleveland.....	1918
TIMOTHY S. HOGAN, Attorney-General.....	1915
**EUGENE F. McCAMPBELL, Ph. D., M. D., Secretary.....	

** Appointed January 17, 1912.

GENERAL REPORT.

This is the twenty-seventh annual report of the State Board of Health, and is for the year ending December 31st, 1912.

PERSONNEL OF THE BOARD.

There were no changes in the personnel of the board since the last report. The term of Dr. Wm. T. Miller of Cleveland, expired December 13th, 1911, and that of Dr. Frank Warner of Columbus, on December 13th, 1912.

SECRETARY.

At the meeting held January 17th, 1912, the board appointed Dr. E. F. McCampbell, Secretary, and Mr. James E. Bauman, who had been acting as secretary, Assistant Secretary. Dr. McCampbell assumed the duties of his office on June 1st, 1912.

MEETINGS.

Fifteen meetings were held during the year, twelve regular and three special meetings. June 28th, a special meeting was held in Cleveland to consider the question of improvement in sewerage conditions in that city. October 10th, a special meeting was held in Akron, in order to give the people of that city an opportunity to be heard regarding sewage and garbage disposal for Akron. November 5th, a special meeting was held in Cincinnati to consider a proposed new water supply for the city of Zanesville. Reports upon these matters occur elsewhere in this report.

The minutes of the meetings and the monthly reports of the Secretary may be found on following pages.

CONFERENCES WITH LOCAL BOARDS OF HEALTH.

Three conferences were held with local boards of health during the year. The first was held at Columbus in January, with representatives of boards of health of municipalities of 3000 or more inhabitants. The second conference was held at Toledo in June, with representatives of boards of health, from townships and villages of a population less than 3000 in northern Ohio, and the third was held in Columbus, with such representatives from southern Ohio. Very interesting addresses and discussions were presented, dealing with subjects pertaining to public health.

and many of these were later published in the MONTHLY BULLETIN of the Board and distributed to health officials, newspapers and periodicals and others interested in sanitary matters.

It has been the observation of the members and officers of the Board that the best work is done in local communities where the cities, villages and townships have sent representatives to these conferences; and it is hoped that in the future broad minded men will be elected or appointed as members of boards of health who will see the advisability and advantage of being represented at these conferences. Much valuable information is received and this can be of benefit to many.

DIVISIONS OF THE DEPARTMENT.

The work of the State Board of Health is divided into five divisions; Administration, Engineering, Hygienic Laboratories, Communicable Diseases, and Plumbing Inspection. The reports of these various divisions may be found on subsequent pages. It is hoped to add a Division of Tuberculosis and a Division of Occupational Diseases, which will materially increase the working staff.

Owing to the growth and consequent congestion of the state offices it has been found necessary from time to time to secure quarters outside of the Capitol Building. During the winter of 1911 need for more space was acutely felt by the Bureau of Inspection of Public Offices and by the State Commissioner of Common Schools. As the law required these departments to be located within the State Capitol a proposition was made to the State Board of Health to move its general offices into an office building. This proposition was agreed to provided a sufficient appropriation was made to enable the Board to consolidate all of the departments in one place. After considerable delay the Emergency Board made an appropriation and steps were at once taken to remove the offices and laboratories from the State House Annex and the engineering department from the Harrison Building, where it had been located for several years.

The only building where sufficient space could be found was the Hartman Building at the corner of Third and State streets, the available space being on the third and fourth floors. It was found advisable to place the general offices and engineering department on the third floor and the laboratories on the fourth floor.

DIVISION OF HYGIENIC LABORATORIES.

The matter of locating and equipping the laboratories was a difficult task as an effort was made to use, so far as possible, the equipment from the old laboratory. The work of designing and equipping the laboratories devolved upon Mr. Fred Berry, assistant bacteriologist, who at that time was in charge, and great credit is due Mr. Berry for the

earnest manner in which he attacked the problem and for the results secured. The State Board of Health has a right to feel that its laboratories are equal to if not better than any laboratories for the same kind of work in the country.

It is the desire to extend the field of usefulness of the laboratories and eventually make it possible for any physician or health official in the state to have made in these laboratories an accurate clinical diagnosis of any disease where this method of procedure will be of value.

August 15th Dr. Thomas R. Brown was appointed bacteriologist in charge of the laboratories.

TYPHOID FEVER VACCINE.

Arrangements have been made in the Hygienic Laboratories for the preparation of typhoid fever vaccine for free distribution. On account of the limited facilities a large stock of vaccine will not be kept on hand in the beginning, but it is hoped that the demand for this product, the efficiency of which has been demonstrated repeatedly in this country, will be so great that it will be necessary to prepare large quantities. The vaccine will be supplied on request from health officers. In issues of the MONTHLY BULLETIN the use of typhoid vaccine as a preventive in typhoid fever has been quite thoroughly exploited.

The vaccine has been used in certain sections of the state rather extensively during the last few months but its cost has in a measure prohibited its being used in large numbers of indigent cases, and it is particularly for the purpose of supplying this class of people that the State Board of Health has undertaken this very important work.

DIVISION OF COMMUNICABLE DISEASES.

There was no unusual prevalence of any communicable disease. A table is given in the report of the epidemiologist, showing the number of cases and deaths reported to the Board. Upon assuming the office, the Secretary took up the matter of the failure on the part of many health officials to make such reports, as required by law, and after addressing two communications to them, calling attention to the requirement, and urging compliance with the law, a marked improvement has been secured.

During the year investigations were made as to the prevalence and methods of spread of acute poliomyelitis (infantile paralysis). Extensive laboratory investigations were conducted in the hope of determining the exact cause of this disease and whether it is transmitted by various insects. The investigations are not yet completed, but will be published in the MONTHLY BULLETIN of the Board. In this work the department has been materially assisted by Mr. C. K. Brain of Cape Town, South Africa, an entomologist, who has had extensive experience in this line of work.

It is aimed to extend the scope of laboratory and field research work on communicable diseases as rapidly as the available appropriations will permit.

TUBERCULOSIS NOW A REPORTABLE DISEASE.

Being convinced that tuberculosis is an infectious and also a contagious disease, the State Board of Health at its meeting on August 15th, acting under authority given in Sections 1243 of the General Code, made the disease reportable after August 15, 1912. It may be said that the placing of this disease on the reportable list is a great progressive step in the campaign against tuberculosis in Ohio. It is obviously an important and primary step in the campaign for the eradication of any disease to know exactly where the disease occurs and also the individuals who are afflicted. Having these facts and data accurately in hand, logical methods of procedure may be developed.

The Ohio Society for the Prevention of Tuberculosis has been especially active in securing the necessary legislation by the State Board of Health in regard to the compulsory reporting of tuberculosis. A clear and concise statement in regard to the great work of this organization in Ohio was printed in the November MONTHLY BULLETIN of the Board.

DIVISION OF ENGINEERING.

On later pages of this report will be found reports on water supplies and sewerage and water and sewage purification plants, considered by the Board during the year. In addition to the investigations required by this work, the engineering department has been constantly engaged in the examination of public water supplies and the pollution of streams throughout the state. The department is frequently called upon to give advice in regard to the maintenance of sewerage systems and sewage purification plants.

In considering questions relating to water supplies and stream pollution throughout the state, it has been the endeavor to take up in a broad way the conditions of the various watersheds in the state with a view to learning the conditions in certain districts. A complete survey of the watersheds of the state is being made by the engineering division and will be published later. The water supplies and sewerage systems of the municipalities from East Liverpool to Bellaire on the Ohio River were investigated and a report has been prepared, to be found on a subsequent page. It is the intention to continue this line of investigation in other parts of the state.

During the past two years, three of the larger cities of Ohio, namely, Toledo, Cincinnati and Cleveland, have undertaken the elimination of insanitary conditions in streams upon which they are situated. In 1910, a commission was appointed by the mayor of the city of Toledo to consider ways and means to eliminate the sewage and stagnant water nui-

sance of Swan Creek. This commission retained Mr. W. J. Sherman of Toledo, consulting engineer, to make an investigation and prepare plans for this work. These plans, which were presented early in 1912, contemplated several schemes, among which was the diversion of the creek or a straightening of the channel, and the construction of either a trunk sewer to replace the creek or an intercepting sewer to keep sewage from polluting the open waters of the stream.

The city of Cincinnati is about to spend \$125,000 on a comprehensive sewerage investigation, and Mr. H. S. Morse has been appointed engineer in charge of this work. The problem will include studies for the improvement of the channel in Mill Creek, and plans for an intercepting sewer for taking all of the sewage of the Mill Creek valley to a suitable location for treatment and disposal. The work will also involve the preparation of a topographic map of the entire sewerage area, a survey of all existing sewers, the planning of release sewers in congested districts and new sewers in recently annexed territory.

In the city of Cleveland it is estimated that the Cuyahoga River receives directly about 44 per cent of the city's sewage. A study is now being made of the sewerage system, and it is planned to make experiments for about one year with the sewage of the city, for the purpose of determining the best and most practicable methods of disposal in order to discontinue the pollution of the Cuyahoga River. It is also planned to eliminate the danger of contamination of the city's water supply, and also to prevent a nuisance along the shores of the lake near the outlet. Mr. R. Winthrop Pratt, consulting engineer, recently chief engineer of the Ohio State Board of Health, was retained by the city to take charge of these investigations.

WATER SUPPLIES AND SEWERAGE.

Plans for new or additional water supplies were acted upon by the Board during the year in the following places: Akron, Alliance, (improvement); Baltic, (site); Canal Dover, Canton, Chagrin Falls, Dayton, Granville, Gibsonburg, Jefferson, Leipsic, (deferrization plant); Lisbon, Magnolia, Malvern, Minster, (deferrization plan); Navarre. Newark, (extension); New Berlin, New Carlisle, New Concord, New Lexington, Oak Harbor (deferrization plant); Oberlin (improvement in softening plant); Payne, Pennsylvania Railway Roundhouse at Mansfield, the plants of the Provident Coal Company near Fairpoint and St. Clairsville, Portsmouth, Scioto County Infirmary, Springfield, Swanton, Sycamore, Twinsburg, Worthington and Zanesville.

Plans for sewerage were acted upon for the following places: Andover, Arlington Heights, Athens, Bedford, Bowling Green, Bremen, Buckeye Lake Park, Cain Realty Company at Cleveland, Canal Dover, Canal Fulton, Canton, Chicago Junction, Cleveland, Forest, Granville,

The Home for Aged and Infirm Deaf, Westerville, Kennedy Heights, Lakeside, Lima State Hospital, Linden Heights, Main Sewer District No. 2 Lucas County, Adams Township, (Gradolph Avenue); Main Sewer District No. 2, Lucas County (sanitary); Millersburg, Mt. Vernon, Muskingum County Children's Home, Napoleon, New Berlin, New London, Oak Harbor, Port Clinton, State Serum Farm near Reynoldsburg, Sandusky, L. S. & M. S. Railway and Toledo Heights, Toledo Glass Company at Toledo, Wildwood Addition, near Toledo, Urbana, Westwood, which is now a part of Cincinnati, (illegal construction).

WATER AND SEWAGE PURIFICATION.

The Board was called upon to pass upon plans for the purification of the water at Alliance, the plants of The Provident Coal Company near Fairpoint and St. Clairsville, Sandusky (improvement and enlargement); Willoughby, Woodsfield (necessity for purification); and Youngstown (improvement and enlargement); and for purification of the sewage at Akron, Alliance, Andover, Ashland, Bellefontaine, (modification of plans); Buckeye Lake Park, Cain Realty Company, Cleveland, Canton, Citizens Land and Improvement Company at Cleveland, Granville, The Home for Aged and Infirm Deaf near Westerville, The Kirtland Farm, near Poland, Lima State Hospital, New Berlin, New London, State Serum Farm near Reynoldsburg, Wildwood addition near Toledo, and Urbana.

BENSE PROPOSITIONS.

April 2nd, 1912, the Supreme Court upheld the constitutionality of the Bense Act. The decision in full was published in the MONTHLY BULLETIN of the Board for April, 1912.

During the year 1912 the Board issued orders under this Act to the cities of Cleveland and Fostoria, and to the villages of Plymouth and Shelby.

The city of Cleveland was ordered to cease polluting the Cuyahoga River and to install such works or means for purifying or otherwise disposing of its sewage or other wastes now being discharged into the river.

The city of Fostoria was ordered to present plans to the Board for the improvement of the sewage disposal plant and to make such improvements within six months after the date of the approval of the Board's order by the Governor and the Attorney General.

The village of Plymouth was ordered to purify its present water supply or secure a new supply, satisfactory to the State Board of Health, within six months after the approval of the Board's order.

The village of Shelby was ordered to reconstruct and enlarge its sewage purification plant within a year from the time the Board's order was approved, and to present plans for such improvement within three months.

In September, 1909, a resolution of the board of health of Ironton, complaining of the water supply of that city, was received. An investigation was made at that time and also January 6th and 7th, 1910, which revealed the following facts: That the well system was not capable of meeting the demands of the city; that the Ohio River water in its raw state was not fit for domestic consumption, and that extension of the well system was not feasible. Following a hearing of the local officials on February 16th, 1910, the Board decided to postpone action under the Bense Act, with the understanding that a definite plan for improving the public water supply would be presented in April. At this time the plans were not presented and the Board extended the time to June 29th. In the meantime the city employed consulting engineers whose report was submitted to the Board at its August 31st, meeting. The recommendations of the consulting engineers advised further examination of the feasibility of obtaining water from horizontal shallow wells in the bed of the Ohio River. On October 20th, 1910, the Board voted to permit the city to proceed with the proposed test in accordance with the recommendations of the consulting engineers. In January, 1911, the chief engineer of the Board reported that no progress had been made in the installation of the test unit and the Board, under date of February 18th, proceeded under the Bense Act, transmitting to the Governor and the Attorney General an order for their approval, requiring the city of Ironton to install and have in operation a water purification plant, satisfactory to the State Board of Health, on or before December 1st, 1911. In May, 1911, Governor Harmon notified the Secretary of the Board that he and the Attorney General had withheld approval of the order, to give the city an opportunity to carry on the proposed tests.

On November 25th and 26th, 1912, the chief engineer and one assistant engineer visited Ironton and made an examination of a test well installed preliminary to the development of the proposed new water supply. The test gave unsatisfactory results, and at a meeting held December 12th, 1912, the Board decided to send a copy of the report of its chief engineer to the Governor and the Attorney General with a request that they consider the report with a view to approving the order of the Board sent to them February 18th, 1911.

Up to the present time no action has been taken by them.

SUMMER RESORT INSPECTION.

The staff of the Secretary made a sanitary survey of the summer resorts of the state and a report of these inspections may be found later on in the report. In every case where necessary, definite recommendations were made. It was the hope that in the interim between the seasons the authorities in these resorts would make the necessary changes so that

by next summer the resorts would be in much better sanitary condition. In every instance, the local boards of health were notified of the findings of the inspectors and requested to abate the nuisances found according to law. In most instances they were quite active in the performance of their duties and reported their work to the Secretary of the State Board of Health. In certain instances the Board passed definite orders requiring sewage purification, etcetera.

The sanitary condition of these resorts in some instances was beyond description. It is strange how thoughtless most of our citizens are when on their summer vacations. They will endure conditions cheerfully at these resorts which they would not tolerate at home.

DIVISION OF PLUMBING INSPECTION.

The Division of Plumbing Inspection has carried on a large amount of inspection work during the past year, but has been unable to make this work as thorough and comprehensive as it should be on account of the lack of assistance, due to limited appropriations. At present the work is carried on entirely by one State Inspector of Plumbing, and it is highly desirable that at least five additional inspectors be added to the staff of this division, in order that the work may be thoroughly done in all parts of the state.

MONTHLY BULLETIN.

In January, 1911, the Board discontinued the quarterly bulletin, which had been published for a number of years and began the publication of the MONTHLY BULLETIN. About eight thousand copies of this are distributed each month to the health agencies, superintendents of schools, newspapers, periodicals and persons interested in sanitary science.

In June, 1912, the Secretary assumed the editorship of this bulletin and established a staff of assistant editors. The publication has been enlarged considerably, a stricter censorship has been exercised over the material published, and an editorial and current comment section has been introduced, which has been found to materially increase the value of the bulletin.

MINUTES OF THE SECRETARY

RESUMÉ OF SECRETARY'S REPORTS.

(13)

JANUARY MEETING

1912

A regular meeting of the State Board of Health was held at the office of the Secretary at 8 p. m., January 17th, 1912.

There were present Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Miller.

A delegation consisting of Mr. Chas. Hoglan, director of public service; Mr. G. C. Cummins, city engineer; Mr. Chas. Kline, special engineer, and Mr. John Roehm, assistant city solicitor, appeared before the Board in regard to what the city of Dayton is proposing to do to secure an additional public water supply.

After some discussion the matter was referred back to the Dayton authorities for additional information, Mr. Hill being appointed a committee to explain to the authorities the character of the information wanted.

A delegation consisting of Mr. W. B. James, city solicitor; Mr. D. C. VanVoorhis, mayor; Mr. W. A. Wariner, director of public service, and Mr. F. E. Munn, of Bowling Green, appeared before the Board and explained proposed plans for sewerage for District No. 4, in which the Northwestern Ohio State Normal School is to be built.

The matter was referred to Executive Session.

Mr. R. Winthrop Pratt, consulting engineer of Cleveland, presented plans for sewage purification for Main Sewer District No. 1, Lucas County, prepared by Mr. Wm. H. Gould, county sanitary engineer, and submitted in place of plans that were disapproved by the Board December 20th, 1911.

On motion of Mr. Hill, seconded by Dr. Miller, these plans were approved provided:

- 1st. That samples of the filtering material be submitted to and receive the approval of the chief engineer of the State Board of Health;
- 2nd. That the plant be completed before the proposed sewers are placed in use; and,
- 3rd. That the plant be operated at all times in a manner satisfactory to the State Board of Health.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Miller.

In the negative, none.

The Board then went into Executive Session.

On motion of Mr. Hill, seconded by Dr. Miller, the minutes of the December 20th, 1911, meeting were approved.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Miller.

In the negative, none.

On motion of Mr. Hill, seconded by Dr. Hasencamp, the monthly report of the acting secretary was approved.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Miller.

In the negative, none.

On motion of Mr. Hill, seconded by Dr. Hasencamp, the report of the Finance Committee was approved; said report being a statement of expenditures from December 16th, 1911, to and including January 15th, 1912, and balances January 15th, 1912.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Miller.

In the negative, none.

On motion of Dr. Grube, a requisition for equipment for the laboratory was referred to the President, with power to act.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Miller.

In the negative, none.

The Board then took up the question of testing the public water supply of Cleveland by animal inoculation to determine the effect of the chlorine treatment of the water.

On motion of Mr. Hill, seconded by Dr. Miller, it was voted to have the laboratory force and the epidemiologist make such tests in the hygienic laboratories, the matter of purchasing animals for this purpose to be left to the Executive Committee.

Dr. Warner presented the name of Dr. Eugene F. McCampbell, of Columbus, for appointment as Secretary of the Board.

On motion of Dr. Miller, seconded by Dr. Grube, Dr. McCampbell was elected Secretary for an indefinite term, with the understanding that the Secretary should do no outside work, except such as would be in line with the work of the Board and with the Board's approval.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Miller.

In the negative, none.

On motion of Dr. Miller, seconded by Mr. Hill, the title of the Acting Secretary, James E. Bauman, was changed from Chief Clerk to Assistant Secretary.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Miller.

In the negative, none.

Mr. Hill presented his report as Engineering Committee, and the questions were taken up in the following order:

On motion of Dr. Miller, seconded by Dr. Grube, it was voted to disapprove the site proposed for the location of public water supply wells for New Berlin, located about 1200 feet northwest of the center of the village between Market and Portage streets; and to notify the authorities at New Berlin that the Board deems it necessary that they should select a site with a more favorable location as regards the proximity to present and future built up portions of the village.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Miller.

In the negative, none.

The report of the committee appointed to investigate and report upon the reconsideration of proposed sewerage for District No. 4, Canton, was then considered.

It was moved by Mr. Hartzell and seconded by Dr. Miller that the authorities of Canton be notified that in view of the already overburdened condition of the sewage purification works the Board deemed it improper to permit the proposed additional sewers of District No. 4 to become tributary until a new plant is provided, and that the Board therefore vote to sustain its former action of September 14th, 1911, disapproving the plans for sewerage for District No. 4 until such time as the city has commenced the construction of a new sewage purification plant to be located on a site satisfactory to the State Board of Health.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Miller.

In the negative, none.

It was moved by Dr. Miller and seconded by Mr. Hartzell to disapprove the plans submitted by Mr. F. G. Gallier, city engineer, on January 6th, 1912, providing for the construction of sewers in Sewer District No. 4, Bowling Green, and for the discharge of crude sewage through alternate outlets into Thurston Ditch at Leroy Avenue and into Poe Ditch some 1900 feet east of Thurston Ditch.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Miller.

In the negative, none.

It being stated by representatives present that the city of Bowling Green will install sewage purification works as soon as possible, it was moved by Dr. Miller and seconded by Mr. Hartzell that the Board agree to approve plans to be presented at its February 15th meeting, which will comprise the following:

1. A plan, satisfactory to the State Board of Health, which will provide for all the sewage of the city being collected at one point where it can ultimately be purified, the location for sewage purification works to be specified in said plans; and,

2. A written agreement by the city of Bowling Green that such sewage purification works will be installed within two years from the date this plan is approved.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Miller.

In the negative, none.

It was moved by Dr. Hasencamp and seconded by Dr. Miller to approve the recommendation of the Engineering Committee advising that the ordinance adopted by the council of Ada, December 19th, 1911, be returned to the mayor for correction, with the statement that it does not conform to the condition of the Board's approval of September 14th, 1911, of the storm water sewers, which requires that all connections that have been made for turning sewage into the storm water sewer system be removed.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Miller.

In the negative, none.

It was moved by Dr. Grube and seconded by Dr. Miller to approve the plans for a proposed deferrization plant for the village of Lodi, submitted by Mr. Philip Burgess, consulting engineer, on December 19th, 1911, upon the following conditions:

1st. That the aerating device be enlarged or otherwise modified if in the opinion of the State Board of Health such enlargement or modification becomes necessary;

2nd. That samples of the filtering material be submitted to and approved by the engineer of the State Board of Health before being placed;

3rd. That the village appoint a competent man to operate the plant; and,

4th. That this approval be void unless construction shall have been commenced prior to May 1st, 1912.

That the Board advise that in the operation of the plant, in washing the filters, the wash water be applied at such a rate as to give vertical rise of at least 18 inches per minute.

Also, that the Board advise that the water supply obtained from drilled wells, as approved September 14th, 1911, be used in preference to that obtained from a dug well as approved November 21st, 1911, for the following reasons:

1st. The safety of the drilled well supply from contamination would be insured, whereas the dug well supply must be considered with suspicion; and,

2nd. The use of the drilled well supply will admit of economy of construction by the use of the already partially built concrete well as a clear water basin.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Miller.

In the negative, none.

A report by the engineer upon the sewerage conditions at Port Clinton was presented. It was found that several miles of combined sewers, with outlets into the Portage River and the shore of Lake Erie, had been constructed at various times without the approval of the State Board of Health, and that in order to abate the nuisance caused by the two lake outlets, and to avoid contamination of the water supply by the river outlets, the sewage should be collected at a suitable point and there purified, or disposed of into the lake by dilution.

It was moved by Dr. Miller and seconded by Dr. Grube to adopt the report of the engineer upon sewerage conditions at Port Clinton, and to notify the authorities of Port Clinton that the Board will require the village to retain the services of a competent sanitary engineer to study their sewage problem with a view to improving present conditions, and also will expect them to submit plans for such improvements not later than July 1st, 1912.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Miller.

In the negative, none.

It was moved by Dr. Hasencamp and seconded by Dr. Miller to approve a proposed water supply for New Lexington, to be obtained from drilled wells located on a site about three-fourths of a mile southeast of the center of the village and to be developed according to plans submitted by Mr. J. R. Tanner, consulting engineer, on March 27th, 1911, upon the following conditions:

1st. That a process for the removal of the excessive iron content be installed to improve the quality of the water;

2nd. That the village council by ordinance cause to be removed all privies, cesspools and other sources of pollution at present located within 500 feet of the waterworks property, said ordinance to provide that when privy vaults or cesspools are abandoned they shall be thoroughly cleaned and disinfected before being filled with clean earth or ashes; and prevent future location of sources of pollution within this distance, said ordinance to be submitted to the Secretary of the State Board of Health for approval before its passage: and,

3rd. That before final acceptance by the village of the water supply an adequate pumping test be made on all of the wells to determine their available yield and that the State Board of Health be notified in advance of the time of such test.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Miller.

In the negative, none.

It was moved by Dr. Miller and seconded by Dr. Hasencamp to approve the recommendation of the Engineering Committee approving the report of the State Inspector of Plumbing, and requesting the said inspector to submit a statement, at the next meeting of the Board, giving in a concise manner, the work of his department during the past year, pointing out the practical results accomplished through the operation of his office.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Miller.

In the negative, none.

On motion of Dr. Grube, seconded by Mr. Hill, it was voted to allow Dr. McCampbell \$25.00 for a report on pathological work, this amount to be paid from the appropriation for "Expenses of Pathological Work."

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Miller.

In the negative, none.

Dr. Grube presented a report on his inspection of sites near Lebanon, Warren County, proposed for a County Tuberculosis Hospital, and recommended that the site in the northwestern part of Lebanon, and the site in a part of the original Tuberculosis Farm which was approved by the Board in 1909, be approved as suitable for the location of such hospital.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Miller.

In the negative, none.

The Acting Secretary presented a list of health officers who had been appointed by their respective councils to serve in lieu of a board of health, and had been properly endorsed.

On motion of Dr. Grube, seconded by Dr. Miller, these health officers were approved.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Miller.

In the negative, none.

It was moved by Mr. Hill and seconded by Dr. Grube to grant licenses to conduct a maternity boarding house and lying-in hospital to the following:

Dr. E. M. Cowles, 6012 Clinton Avenue, Cleveland, allowing four women and nine children.

Mrs. Grace Mills, 1423 East 47th Street, Cleveland, allowing ten women and nineteen children.

The Catherine Booth Home for Girls, corner Windsor Street and Gilbert Avenue, Cincinnati, allowing twelve women and twenty-five children. (Renewal.)

Mrs. Ida Prickett, 639 West 6th Street, Cincinnati, allowing two women and two children. (Renewal).

Mrs. Elizabeth Steinhauer, 2083 West 26th Street, Cleveland, allowing one woman and six children. (Renewal.)

Mrs. Nora Foster, 43 West Oakland Avenue, Columbus, allowing two women and two children. (Renewal.)

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Miller.

In the negative, none.

On motion of Mr. Hill, seconded by Dr. Miller, the President and Secretary were authorized to employ a stenographer for the general office, at a salary not to exceed \$60.00 per month.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Miller.

In the negative, none.

On motion of Mr. Hill, seconded by Dr. Miller, it was voted to employ Allen C. Lucas, of Cleveland, as assistant in the Engineering Department, at a salary of \$75.00 per month, the time of his reporting for work to be fixed by the Acting Chief Engineer.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Miller.

In the negative, none.

On motion of Dr. Grube, seconded by Dr. Miller, the Acting Secretary was instructed to notify the Secretary General of the 15th International Congress on Hygiene and Demography that the State Board of Health will be represented at the meeting of the Congress to be held in Washington, D. C., September 23rd-28th, 1912.

Dr. Warner made a report in reference to a request from the Adjutant General that the Board find quarters outside of the State House, in order to allow more rooms to certain departments that are required by law to remain in the State House.

On motion of Dr. Hasencamp, seconded by Mr. Hill, the President was authorized to make whatever arrangements are necessary.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Miller.

In the negative, none.

Dr. Hasencamp brought up the question of reporting and publishing the proceedings of the conferences of State and local boards of health, and on motion of Dr. Miller, seconded by Mr. Hill, it was voted to appoint a Publication Committee, consisting of Dr. Hasencamp and the Secretary, whose duty it shall be to edit all papers and the discussions thereon presented at these conferences, and that a stenographic report of all these conferences be made.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Miller.

In the negative, none.

It was moved by Mr. Hill and seconded by Dr. Miller, that the next meeting of the Board be held in Cincinnati, Thursday evening, February 15th, 1912. Carried.

Upon motion of Mr. Hill, the Board then adjourned.

Attest:

JAMES E. BAUMAN,
Acting Secretary.

Approved February 15th, 1912.

FEBRUARY MEETING

1912

A regular meeting of the State Board of Health was held at the Sinton Hotel, Cincinnati, February 15th, 1912, at 8 p. m.

There were present Drs. Warner, Hasencamp, Grube, Sutton, Mr. Hill and Mr. Hartzell.

On motion of Mr. Hill, seconded by Dr. Grube, the minutes of the January meeting were approved.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Grube, Sutton, Hill and Hartzell.

In the negative, none.

Dr. Warner, as chairman, presented the following report and recommendations of the Executive Committee:

1st. That the following purchases be made:

American Medical Directory (Third Edition).

Polk's Medical Register and Directory, Twelfth Edition (\$10.00).

The American Association of Medical Milk Commissions, Second, (\$3.50).

Third, Fourth and Fifth Annual Reports.

One Bullinger Postal and Shipping Guide, (\$3.00).

One Scarborough map of Ohio, (\$2.50).

One roll top typewriter desk.

It was moved by Mr. Hill, and seconded by Mr. Hartzell, that these purchases be authorized.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Grube, Sutton, Hill and Hartzell.

In the negative, none.

2nd. That Miss Cohen be appointed as a temporary stenographer in the Secretary's office, at \$60.00 per month.

It was moved by Mr. Hill and seconded by Mr. Hartzell that Miss Cohen be employed as temporary stenographer at \$60.00 per month.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Grube, Sutton, Hill and Hartzell.

In the negative, none.

3rd. That while Mr. Bauman is acting as Secretary the Board pay for the telephone in his residence, but during that time only.

It was moved by Mr. Hill and seconded by Mr. Hartzell that this be done.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Grube, Sutton, Hill and Hartzell.

In the negative, none.

4th. That the Board publish as an official document, a report prepared by Mr. R. G. Paterson, Executive Secretary of the Ohio Society for the Prevention of Tuberculosis, on "A Survey of the Tuberculosis Situation in Ohio."

It was moved by Mr. Hill and seconded by Mr. Hartzell that the Board publish this report as an official document.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Grube, Sutton, Hill and Hartzell.

In the negative, none.

The chairman of the committee reports that he has held a number of conferences relative to removal of the departments from the State House and that the Emergency Board has not granted the amount thought necessary to enable this to be done.

It was moved by Mr. Hill, and seconded by Mr. Hartzell, that Mr. W. H. Dittoe, acting chief engineer, be appointed as chief engineer at a salary of \$3,000.00, beginning February 16th, 1912.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Grube, Sutton, Hill and Hartzell.

In the negative, none.

Dr. Hasencamp moved, and it was seconded by Mr. Hill, that twelve sets of the Monthly Bulletin for 1911 be bound for the members of the Board and for records.

Those voting in the affirmative were Messrs. Hasencamp, Grube, Hill and Hartzell.

In the negative, none.

Mr. Hill moved, and it was seconded by Dr. Grube, that two members of the Board and the Acting Secretary be appointed delegates to the Eighth Annual Conference of the American Medical Association, on Medical Education, Medical Legislation and Public Health, to be held in Chicago, February 26th and 27th, 1912.

The President appointed Mr. Hill and Dr. Grube, members, and the Acting Secretary, delegates to this meeting.

It was moved by Dr. Grube and seconded by Mr. Hill that a freezing microtome be purchased for the laboratory.

Those voting in the affirmative were Messrs. Hasencamp, Grube, Hill and Hartzell.

In the negative, none.

Dr. Sutton brought up the question of the water supply selected for the village of Bremen, the matter of reconsidering the Board's former action (September 14th, 1911), disapproving the supply having been referred to Dr. Sutton and Mr. Hill at the December meeting.

On representation of officials of the village that plans are being prepared for a system of sewers that will effectually drain all property within a radius of 1000 feet of the selected source of supply, it was moved by Mr. Hill and seconded by Dr. Sutton that the Board rescind its action of September 14th, 1911, subject to compliance with the following conditions:

1st. That plans for sewers, as specified above, be completed at the earliest possible time and be submitted to the State Board of Health for approval, and that these sewers be constructed as soon as possible:

2nd. That as soon as sewers in this district have been completed all cesspools and privy vaults within 1000 feet of these wells be abandoned, thoroughly cleaned and disinfected and be filled with clean earth, ashes or concrete, level with the surrounding surface and connections be made direct from the house drains to the sewer;

3rd. That all visible sources of pollution of the subsoil on premises within 1000 feet of the source of supply be thoroughly disinfected and rendered innocuous; and,

4th. That no taps shall be made to the mains through which drinking water can be taken prior to the completion and starting in operation of the sewer system excepting upon approval of the Secretary of the State Board of Health.

Those voting in the affirmative were Messrs. Hasencamp, Grube, Sutton, Hill and Hartzell.

In the negative, none.

On motion of Mr. Hill, seconded by Dr. Grube, the report of the Finance Committee was approved; said report being a statement of expenditures from January 16th, 1912 to and including February 15th, 1912, and also statement of balances on February 15th, 1912.

Those voting in the affirmative were Messrs. Hasencamp, Grube, Hill and Hartzell.

In the negative, none.

Mr. Hill presented his report as Engineering Committee, and the questions were taken up in the following order:

On motion of Mr. Hill, seconded by Dr. Grube, it was voted to not reconsider the Board's action of January 17, 1912, disapproving the site proposed for the location of the public water supply wells for New Berlin, but to advise that the village authorities select a site better adapted to future needs.

Those voting in the affirmative were Messrs. Hasencamp, Grube, Hill and Hartzell.

In the negative, none.

It was moved by Dr. Grube and seconded by Mr. Hartzell to approve the general plan for sewerage and sewage purification works for Canal Fulton, submitted by Mr. F. E. Myers, consulting engineer, January 26th, 1912, subject to the following conditions:

1st. That the approval of the proposed location of the sewage purification works is withheld;

2nd. That detailed plans of the purification works including its location, be submitted to and receive the approval of the State Board of Health prior to its installation; and,

3rd. That this approval be void unless construction of the sewers and sewage purification works be completed prior to January 1st, 1917.

Also, to approve the plans for a sewer extending 720 feet in Canal Street and 480 feet in Poplar Street, with a temporary outlet into the Tuscarawas River, with the following conditions:

1st. That the outlet be located at least 300 feet below Poplar Street and carried into the current of the stream and placed at such elevation as to be submerged at all times;

2nd. That no new sewers be made tributary to this outlet until plans for the same shall have been submitted to and approved by the State Board of Health.

3rd. That sewage purification works be constructed when deemed necessary by the State Board of Health.

4th. That an accurate record of all connections to the sewers be maintained.

5th. That this approval be void unless the construction shall have been completed prior to November 1st, 1912.

Those voting in the affirmative were Messrs. Hasencamp, Grube, Hill and Hartzell.

In the negative, none.

It was moved by Mr. Hill and seconded by Dr. Grube to withhold approval of plans for a deferrization plant for Oak Harbor, submitted by Mr. George Champe, consulting engineer, January 18th, 1912, in compliance with the second condition of the Board's approval of a water supply for that village, and to advise that an aerating device of more satisfactory design should be provided to insure a permanent efficiency of aeration.

Those voting in the affirmative were Messrs. Hasencamp, Grube, Hill and Hartzell.

In the negative, none.

The Acting Secretary was instructed to advise the consulting engineer that conditions at Oak Harbor appeared favorable to the use of forced aeration of the water to precipitate the iron, and to suggest that he confer with the Board's chief engineer in regard to this.

It was moved by Mr. Hill and seconded by Dr. Grube to withhold approval of the deferrization plant already installed at Leipsic (plans of which were prepared and submitted by Mr. George Champe, consulting engineer, December 20th, 1911), and to advise that an aerating device of more satisfactory design should be provided to insure a permanent efficiency of aeration.

Those voting in the affirmative were Messrs. Hasencamp, Grube, Hill and Hartzell.

In the negative, none.

The Acting Secretary was instructed to advise the consulting engineer that conditions at Leipsic appeared favorable to the use of forced aeration of the water to precipitate the iron, and to suggest that he confer with the Board's chief engineer in regard to this.

An additional water supply proposed for the village of Granville, obtained at a depth of 125 feet from a drilled well located on the site of the present supply wells, was considered, request for approval of same having been made by Mr. John M. Swartz, mayor, January 10th, 1912.

It was moved by Mr. Hill, and seconded by Dr. Grube, to withhold approval of this additional water supply and to advise that the village employ a competent sanitary engineer to make a study of the problem of an additional water supply with a view to securing an entire new supply.

Those voting in the affirmative were Messrs. Hill, Hasencamp, Grube and Hartzell.

In the negative, none.

The Acting Secretary was instructed to call the attention of the village authorities to the following facts:

1st. That the present supply, installed in 1884, while originally of excellent quality, now shows evidence of remote contamination, and that this supply should be abandoned before its quality has become seriously impaired by encroachment of the built up portion of the village.

2nd. That the water from the proposed new well, obtained at a depth of 125 feet, while of satisfactory quality from a sanitary standpoint, contains an excessive iron content which will cause complaint on the part of the consumers unless a process for its removal is provided.

3rd. That in view of these facts it appears advisable, in securing a new water supply, that the village obtain a more satisfactory location for wells at a point beyond the influence of contamination from the village, where water of entirely satisfactory quality may be secured.

It was moved by Mr. Hill and seconded by Dr. Grube to withhold approval of the plans for sanitary sewers for Urbana, submitted by Mr. C. S. Pratt, city engineer, February 7th, 1912, and to advise that while the plans for sanitary sewers are in general satisfactory, before approval is given the Board will require that plans for a sewage purification plant, satisfactory to the State Board of Health, be submitted.

Those voting in the affirmative were Messrs. Hasencamp, Grube, Hill and Hartzell.

In the negative, none.

The Board then took up for consideration protests received from the Canton Board of Trade, the Business Men's Association, and the Canton Medical Society, and petitions signed by some eighty-seven resi-

dents between the city of Canton and the village of North Industry, protesting against the proposed location for the sewage purification plant.

It was moved by Mr. Hill and seconded by Dr. Grube that the Board require the city of Canton to submit plans showing the general type of purification works proposed and to defer action until these plans have been submitted and it is determined whether or not the proposed plant can be constructed on the site selected without detriment to those living or owning property in the neighborhood.

Those voting in the affirmative were Messrs. Hasencamp, Grube, Hill and Hartzell.

In the negative, none.

The Acting Secretary was instructed to acknowledge receipt of the protests and to notify the petitioners and the authorities of Canton of the action taken.

It was moved by Mr. Hartzell and seconded by Dr. Grube to approve the plans submitted January 22nd, 1912, by Mr. George M. Cotter, superintendent of the waterworks at Springfield, providing for the construction of an underground wall and galleries in the gravel deposits across the valley of Buck Creek to intercept the ground water flow and thus augment the public water supply; and to disapprove the general project of natural filtration of Buck Creek water by flooding areas north of the existing pump well, as shown on plans submitted by Mr. Cotter on January 22nd, 1912, for the reason that there is not sufficient or satisfactory filtration of the water thus reaching the pump well.

Those voting in the affirmative were Messrs. Hill, Hasencamp, Grube and Hartzell.

In the negative, none.

The proposed additional water supply for Dayton, as shown on plans submitted by the director of public service on December 30th, 1911, was taken up for consideration.

It was moved by Dr. Grube and seconded by Mr. Hartzell to approve this proposed additional water supply as regards its quality with the following condition, namely, that the city authorities permanently control, by purchase or otherwise, all territory within 1000 feet of any of the proposed wells, and cause to be removed, and prevent the future establishment of, sources of contamination within this distance; and that a certified copy of an ordinance by the city council providing for such purchase or control be filed with the Secretary of the State Board of Health before any of the proposed wells are placed in use, said ordinance to be approved by the State Board of Health before its passage.

Also, insufficient data on the available yield of the gravel deposits of the Mad River Valley having been submitted and in the absence of such data the danger of inadequacy of the supply within twenty-five years being anticipated, that the Board recommend that suitable tests be made of the rate of flow of ground water at different depths and that a full

and complete statement of the results of these tests and other data obtainable be furnished the State Board of Health.

Also, that the Board urge that an expert be employed to study the general problem of the water supply improvement with a view to obtaining a comprehensive knowledge of the possibilities of various methods of development, including the use of a purified surface supply as well as that of a ground water supply.

Those voting in the affirmative were Messrs. Hasencamp, Grube, Hill and Hartzell.

In the negative, none.

On motion of Mr. Hill, seconded by Mr. Hartzell, the monthly report of the Secretary was approved.

Those voting in the affirmative were Messrs. Hasencamp, Grube, Hill and Hartzell.

In the negative, none.

The Board then took up the question of approval of the revised plans for proposed sewerage for Sewer District No. 4, Bowling Green, including an improvement in the present sewerage system providing for the collection of the entire sewage of the city at one outlet, said plans having been submitted January 31st, 1912, by Mr. G. L. Moyer, city engineer, in accordance with the agreement made by representatives of the city at the meeting of the Board January 17th, 1912.

It was moved by Mr. Hartzell and seconded by Dr. Grube to approve these plans, in accordance with the agreement entered into between the officials of Bowling Green and the State Board of Health on February 8th, 1912, and as further agreed by Mr. W. A. Wariner, director of public service and Mr. D. C. VanVoorhis, mayor, who were present, provided:

1st. That plans for the purification of the sewage of the entire city be prepared and presented to the State Board of Health for approval not later than November 1st, 1913;

2nd. That construction of a sewage purification plant, according to plans approved by the State Board of Health, shall be begun not later than April 1st, 1914; and,

3rd. That the said plant shall be completed and in operation not later than September 1st, 1914.

Those voting in the affirmative were Messrs. Hasencamp, Grube, Hill and Hartzell.

In the negative, none.

A list of health officers, appointed by their respective councils and endorsed by the president of the Medical Society of the county in which the appointee lives, was presented.

On motion of Dr. Grube, seconded by Mr. Hill, these health officers were approved.

Those voting in the affirmative were Messrs. Hasencamp, Grube, Hill and Hartzell.

In the negative, none.

A list was presented of health officers who had been serving in lieu of a board of health and who had been reappointed by the respective councils but not endorsed by the president of the Medical Society of the county in which they reside.

On motion of Mr. Hill, seconded by Dr. Grube, these health officers were approved.

Those voting in the affirmative were Messrs. Hasencamp, Grube, Hill and Hartzell.

In the negative, none.

A list of health officers was presented who had been appointed by council and endorsed by five property holders of their respective villages, but not endorsed by the president of the Medical Society of the county in which they reside.

On motion of Dr. Grube, seconded by Mr. Hill, these health officers were approved.

Those voting in the affirmative were Messrs. Hasencamp, Grube, Hill and Hartzell.

In the negative, none.

A communication from the mayor and council of Canal Dover was presented, asking the Board to appoint Mr. John J. Jurgess health officer of that city.

On motion of Mr. Hill, seconded by Dr. Grube, it was voted to appoint John J. Jurgess health officer of Canal Dover, to serve in lieu of a board of health, for a term of one year, at a salary of \$15.00 per month.

Those voting in the affirmative were Messrs. Hasencamp, Grube, Hill and Hartzell.

In the negative, none.

The appointment of Dr. Otto Carl Stutz as health officer of Upper Sandusky was taken up for consideration, protests having been made to the appointment. In view of the fact that Dr. Stutz was approved by the Board last year, after protests against his appointment had been investigated, and that he had been endorsed by five property holders of the village, it was moved by Mr. Hill and seconded by Dr. Grube, to approve his appointment for this year.

Those voting in the affirmative were Messrs. Hasencamp, Grube, Hill and Hartzell.

In the negative, none.

The application for the approval of the appointment of S. L. Davis as health officer of Jeromeville was presented, with protests against the approval of his appointment.

On motion of Mr. Hill, seconded by Dr. Grube, the Acting Secretary was instructed to notify the council of Jeromeville that protests having been made against the appointment of Mr. Davis, the Board deemed it unadvisable to approve his appointment and referred the matter back to council so that a new appointment might be made, and advised that a physician be appointed as health officer.

Those voting in the affirmative were Messrs. Hasencamp, Grube, Hill and Hartzell.

In the negative, none.

The appointment of Dr. E. W. Brown as health officer of New Vienna was presented and a protest against his approval.

On motion of Mr. Hill, seconded by Dr. Grube, the Acting Secretary was instructed to notify council that owing to protest against the approval of Dr. Brown, the Board deemed it unadvisable to approve his appointment and referred the matter back to council so that a new appointment might be made.

Those voting in the affirmative were Messrs. Hasencamp, Grube, Hill and Hartzell.

In the negative, none.

The following applications for renewal of license to conduct a maternity boarding house and lying-in hospital were presented:

Mrs. James T. Black, 633 West Spring St., Lima, with permission to keep one woman and one child.

Mrs. Mary E. Thorp, Jason Avenue, Station B., Route 7, Columbus, with permission to keep fourteen children.

On motion of Mr. Hill, seconded by Mr. Hartzell, these licenses were renewed.

Those voting in the affirmative were Messrs. Hasencamp, Grube, Hill and Hartzell.

In the negative, none.

The following resolution adopted by the Executive Committee of the Grand Council of Ohio, United Commercial Travelers was presented:

WHEREAS, The use of roller towels in wash rooms of hotels, and the indiscriminate use of the same towel on several different customers in barber shops is one of the most prolific sources for the spread of obnoxious, contagious and infectious diseases, and

WHEREAS, The use of comforts and blankets on beds in hotels, in which are breathed consumption and other contagious diseases by some guest one night, and inhaled and drawn into the lungs of some other guest the next night, making a very dangerous and unsanitary condition, and

WHEREAS, The State Board of Health of Ohio is doing a great good for the welfare of the public in their efforts to eradicate obnoxious, contagious and infectious diseases; therefore

Be it resolved, By the Executive Committee of the Grand Council of Ohio, U. C. T., That the Grand Secretary shall immediately call the attention of the State Board of Health to the matter above stated, and ask that the said Board shall

First, Insist upon all hotel and inn-keepers in the State of Ohio furnishing individual towels to guests.

Second, That a towel once used upon a customer in any barber-shop in Ohio shall not be used upon another customer until said towel has been laundered.

Third, That the upper sheet on any bed or cot in any hotel or inn in Ohio shall not be less than nine feet in length, so that at least 14 inches of said sheet may be turned over the top of the comfort or blanket.

Respectfully submitted,

HOWARD A. TURNER, *Grand Counselor*

J. C. NESBITT, *Grand Treasurer,*

E. G. WITMER,

J. D. MARSH,

W. E. BOOTH,

ROBT. ARNOTT,

R. F. SOMERVILLE, *Grand Secretary,*

*Members of the Executive Committee
of the Grand Council of Ohio, U. C. T.*

It was moved by Mr. Hill and seconded by Dr. Grube that the Board endorse this resolution.

Those voting in the affirmative were Messrs. Hasencamp, Grube, Hill and Hartzell.

In the negative, none.

The full report, made by the State Inspector of Plumbing of the work done in his department since February 15th, 1911, was received and on motion of Mr. Hill, seconded by Dr. Grube, ordered filed.

Those voting in the affirmative were Messrs. Hasencamp, Grube, Hill and Hartzell.

In the negative, none.

The following resolution, offered by the health officer of Toledo, at the January conference of boards of health, was presented:

Resolved, That the Ohio State Board of Health be requested to furnish to the municipal departments copies of the information given to families in which diphtheria, scarlet fever, typhoid fever and pulmonary tuberculosis exist, regarding "their prevention and restriction" in the German, Polish and Hungarian languages, or any other foreign language for which a necessity arises.

On motion of Mr. Hill, seconded by Dr. Grube, the Acting Secretary was instructed to inquire into the method and cost of printing all of these circulars in the foreign languages, and to learn from the health officers of cities having a large foreign population the probable need of such circulars in their community.

Those voting in the affirmative were Messrs. Hasencamp, Grube, Hill and Hartzell.

In the negative, none.

The Acting Secretary presented the following communication from the State Commission for the Blind:

"To the State Board of Health, Columbus, Ohio.

GENTLEMEN:—The bill creating the State Commission for the Blind provides that this Commission

'shall make inquiries concerning the cause of blindness to ascertain what portion of such cases are preventable and co-operate with the State Board of Health in the adoption and enforcement of proper preventive measures.' (Sec. 1367, Gen'l Code, 1910).

The budget of the Commission for this year has a definite sum assigned for such work.

The Commission feels that the time is hardly appropriate for a state-wide study and regulation of the conditions under which the largest percent of unnecessary blindness occurs, but that effective work in some one locality might serve as a demonstration for a later state-wide campaign.

With such a policy in mind the Commission has conferred with the board of health and its newly organized Bureau of Child Hygiene in Cleveland, where the local agencies are already in line for this definite piece of work as a result of a similar campaign conducted in 1910-11 by the Cleveland Society for the Blind. Unfortunately the city funds which are available this year are not sufficient to cover this work in Cleveland and the campaign so effectively begun is at present carried on only in a very limited way.

The Commission has a lecturer in the field who is daily calling attention to the need of the care of the eyes at birth but aside from him the Commission has no agent trained in this special field capable of conducting the pioneer work of prevention in a new field. By placing an agent in Cleveland to work with the Health Department and the Bureau of Child Hygiene we can avail ourselves of the services of all the local health agencies which are already in harmony with us. Furthermore, this co-operation with the city authorities will place at our disposal all the records and data which will enable us to recommend the adoption of a permanent state wide policy.

With the foregoing in mind the Commission for the Blind wishes to submit, for your approval, the following plan:

The State Commission for the Blind shall provide, with the approval of the State Board of Health, an "Agent for the Prevention of Blindness" to work with the Cleveland board of health under its Bureau of Child Hygiene in investigating and regulating the practice of midwifery as it affects the condition of the eyes in the new-born; in following up cases of contagion or incipient eye diseases diagnosed in the public school or hospital clinics which have failed to secure treatment; in discovering in factories, stores or other industrial groups conditions involving undue eye strain; or in any other way pursuing a study or treatment of conditions involving possible blindness or defective vision.

It is understood that the Commission shall at all times be free to withdraw such agent from Cleveland for similar work in any other locality, providing that such withdrawal does not jeopardize the work under way in Cleveland.

Hoping that the Board of Health will approve, at its meeting February 15th, of the above plan for the co-operation of the State Commission for the Blind and the Cleveland Board of Health,

I am, Gentlemen,

Yours faithfully,

(Signed) CHARLES F. F. CAMPBELL,

Executive Secretary."

On motion of Dr. Grube, seconded by Mr. Hill, it was voted to endorse the above plan.

Those voting in the affirmative were Messrs. Hasencamp, Grube, Hill and Hartzell.

In the negative, none.

Mr. Hill spoke of the scarlet fever situation in Cincinnati, Lockland and Arlington Heights, and said that when a complete report had been made by Dr. Boudreau the Board could determine what further action should be taken.

On motion of Dr. Grube, seconded by Mr. Hill, Dr. Hasencamp was appointed a committee to arrange the program for the June Conference with boards of health of villages and townships in northern Ohio.

It was decided to hold the next meeting of the Board at the Hotel Secor, Toledo, Thursday evening, March 21st, 1912.

The Board then adjourned.

Attest :

JAMES E. BAUMAN,
Acting Secretary.

Approved *March 3rd, 1912.*

MARCH MEETING

1912

A regular meeting of the State Board of Health was held at the Hotel Secor, Toledo, March 21st, 1912, at 8 P. M.

There were present Drs. Warner, Hasencamp, Grube, Sutton and Mr. Hill.

The following committee from the city of Canton appeared before the Board: John T. Blake, city solicitor, Phil. H. Weber, city engineer; Ray F. Harbert, director of public service; L. B. Oliger, superintendent of waterworks, and R. Winthrop Pratt, consulting engineer of Cleveland.

Mr. Blake spoke of the past actions of the Board in regard to location of a site for sewage purification works; sewerage for District No. 4, and the advisability of installing a plant for the chemical treatment of that part of the present water supply taken from the race.

Mr. Harbert spoke of the sources from which the present water supply is obtained, and of the shortage of the supply which makes it necessary to take a part of the supply from the race.

Mr. Oliger explained the pumping machinery used in the waterworks.

Mr. Pratt, as consulting engineer, gave the results of a recent investigation of the site chosen for purification works and stated that it was the belief that purification works could be located at this site without offense.

In response, Mr. Dittoe spoke in regard to past actions of the Board, correcting the statements made by Mr. Blake relative to the Board's having withdrawn its approval of the site for purification works. He also gave information regarding the present water supply and the methods of pumping.

Mr. Hill suggested to the committee that the difficulty encountered might be due to improper use of the pumps and advised the installation of a small pump for the creation of a vacuum, which would give relief to the present pumping machinery and probably enable them to secure more water from their wells.

The Acting Secretary notified the Board that the petitioners who had protested against the site selected desired a hearing before final action is taken.

On motion, it was voted to refer these matters to a committee to consist of Mr. Hill, Mr. Hartzell and Mr. Dittoe, for investigation. Mr. Pratt was requested to be present when the committee met in Canton and the Acting Secretary was instructed to notify the petitioners of the time of the meeting.

Mr. Pratt notified the Board that the city of Cleveland had made an appropriation of \$20,000 for a sewage testing station.

The report of the special committee, Mr. Dittoe, chairman, Mr. Hill, Dr. Miller and Dr. Warner, on the public water supply of Cleveland with reference to the treatment with calcium hypochlorite was presented.

On motion of Mr. Hill, seconded by Dr. Sutton, this report was adopted and the Acting Secretary was instructed to send a copy of the report to the council of the city of Cleveland, calling especial attention to the recommendations of the committee contained in said report.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Grube, Sutton and Hill.

In the negative, none.

The report of the chairman of the finance committee was presented, and, on motion of Dr. Sutton, seconded by Dr. Hasencamp, was adopted. (Expenditures from Feb. 16th, to and including March 15th, 1912).

The minutes of the February meeting were presented, and on motion of Mr. Hill, seconded by Dr. Grube, approved.

Mr. Hill then presented the following report of the executive committee:

"The personnel of the assistants in the Engineering Department and their respective salaries are as follows:

Mr. M. Z. Bair, engineering assistant, \$1020 per annum.

Mr. R. F. MacDowell, engineering assistant, \$1020 per annum.

Mr. L. H. VanBuskirk, engineering assistant, \$960 per annum.

Mr. A. C. Lucas, engineering assistant, \$900 per annum.

"It is respectfully recommended that the following revisions be made in the organization of the Engineering Department, to take effect April 1st, 1912:

1st. That Mr. M. Z. Bair be given the title of principal assistant engineer, with a salary of \$1400 per annum:

2nd. That Mr. R. F. MacDowell be given the title of assistant engineer, with a salary of \$1300 per annum:

3rd. That Mr. L. H. VanBuskirk be given the title of assistant engineer, with a salary of \$1200 per annum; and

4th. That Mr. A. C. Lucas (engaged February 1st, 1912) retain his present title of engineering assistant and salary of \$900 per annum.

"It is recommended that the following purchases be authorized:

For the Engineering Department—

1 rug 10 by 18.....	\$35 00
1 rug 9 by 12.....	30 00
1 revolving desk chair, 3 ft. high (without arms) golden oak finish.	

For the Laboratory—

1 No. 1355 Haemocytometer complete in case with pipettes and Tuerck ruling and counting chambers.....	\$12 00
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"It is recommended that the following books be purchased:

For the Library—

"Sewage Sludge," by Kenneth Allen.....	\$2 50
"Experiments on the Effect of Freezing and other Low Temperatures upon the Viability of Bacillus of Typhoid Fever, with Considerations regarding Ice as a Vehicle of Infectious Diseases," by Sedgwick & Winslow.....	2 50
" <i>Diagnostic</i> . Physiological Histology—Methods and Theories of Staining, Etc.," by Mann.....	5 00
"Prevention of Infectious Diseases," by Doty.....	2 50
"Pathogenic Bacteria and Protozoa," Revised Edition, by Park & Williams	3 75
" <i>Chemical</i> . Examination of Water and Water Supplies," by Thresh..	4 00
"Quantitative Chemical Analysis," by Olsen.....	4 00
" <i>Water Bacteriological</i> . Agricultural Bacteriology," by Conn.....	2 00

Respectfully submitted,

(Signed) FRANK WARNER, *Chairman*,
JOHN W. HILL,
Committee.

It was moved by Dr. Grube and seconded by Dr. Sutton to approve this report.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Grube, Sutton and Hill..

In the negative, none.

Dr. Warner brought up the question of a Tuberculosis Exhibit, to be used in conjunction with the Ohio Society for the prevention of Tuberculosis; and also the consideration of a general Health Exhibit.

It was moved by Mr. Hill and seconded by Dr. Sutton that these matters be referred to a committee to consist of Dr. Grube and the Secretary.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Grube, Sutton and Hill.

In the negative, none.

Mr. Hill then presented his report, as engineering committee, and the various questions were taken up and disposed of in the following order:

It was moved by Dr. Sutton and seconded by Dr. Grube to approve the plans for proposed sewerage and sewage purification for Andover, submitted by Mr. B. F. Hewitt, consulting engineer for the village, on March 9th, 1912, with the following conditions:

1st. That an area of at least three acres be acquired for the location of sewage purification works, to provide for future extensions.

2nd. That no connections to the sewers be made prior to the construction of the purification works;

3rd. That the plant be altered, repaired, or enlarged, when in the opinion of the State Board of Health such alterations, repairs, or enlargements shall have become necessary;

4th. That samples of the filtering material be submitted to and receive the approval of the engineer of the State Board of Health;

5th. That plans of the automatic dosing apparatus be submitted to the State Board of Health;

6th. That the village council appoint a superintendent of sewers whose duties shall include the general supervision of the sewerage system, the maintenance of records of connections, etc., and the operation and care of the sewage purification works; and,

7th. That this approval be void unless contracts for construction of the sewers and sewage purification works shall have been let prior to January 1st, 1913.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Grube, Sutton and Hill.

In the negative, none.

It was moved by Dr. Hasencamp and seconded by Dr. Sutton to approve the proposed water supply for Malvern, obtained from drilled wells at depths of from 68 feet to 107 feet and located on Site B., so-called, approved September 14th, 1911, with the following conditions:

1st. That a process for iron removal be installed if in the opinion of the State Board of Health future examinations demonstrate its necessity;

2nd. That the village council by ordinance provide (a) for the removal of a leaching privy vault located some 400 feet northeast of the test well and the substitution of a concrete or watertight vault or watertight surface receptacle, and (b) for the prevention of the establishment of leaching privy vaults and cesspools and other possible sources of contamination within a radius of 500 feet from the proposed wells; and that said ordinance be submitted to the Secretary of the State Board of Health for approval before its passage;

3rd. That detailed plans showing the method of development and handling of the supply be submitted to and receive the approval of the State Board of Health; and,

4th. That this approval be void unless said plans shall have been submitted to the State Board of Health prior to August 1st, 1912.

(Complying with the third condition of approval, plans and specifications for the development of the supply were received from the consulting engineer on March 16th, and will be acted upon at a future meeting of the Board.)

Those voting in the affirmative were Messrs. Warner, Hasencamp, Grube, Sutton and Hill.

In the negative, none.

It was moved by Dr. Grube and seconded by Dr. Sutton to approve the proposed location for public water supply wells for New Berlin, situated on the property of Solomon Gilver some 600 feet north of the northerly corporation line of the village and 600 feet east of Market Street, with the following conditions:

1st. That the supply be derived from drilled wells obtaining their water below an impervious stratum;

2nd. That the quality and quantity of the supply obtainable, as demonstrated by a test well, be satisfactory to the State Board of Health;

3rd. That an area of at least one acre be purchased for water supply purposes;

4th. That before contracts for the installation are awarded, plans for the development of the supply be submitted to and receive the approval of the State Board of Health; and,

5th. That this approval be void unless a test well shall have been drilled and plans submitted prior to August 1st, 1912.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Grube, Sutton and Hill.

In the negative, none.

It was moved by Dr. Sutton and seconded by Dr. Hasencamp to approve the plans for sanitary sewers submitted by Mr. C. S. Pratt, city engineer, February 7th, 1912, and the plans for sewage purification works, submitted by Mr. A. Elliott Kimberly, consulting engineer, March 9th, 1912, for the city of Urbana with the following conditions:

1st. That the sewage purification works be constructed and ready for operation before any connections are made to the proposed sewers;

2nd. That all reasonable precautions be taken in the construction of the sewerage system to prevent the entrance of ground water into the sewers.

3rd. That the sewage purification works be altered, repaired, or enlarged, when in the opinion of the State Board of Health such alterations, repairs, or enlargement shall become necessary;

4th. That detailed plans of the automatic dosing and discharging apparatus be submitted to the State Board of Health;

5th. That full detailed plans of the primary tanks be submitted to and receive the approval of the State Board of Health;

6th. That samples of filtering material for the contact filters and sludge filter be submitted to and receive the approval of the engineer of the State Board of Health;

7th. That the city council appoint a superintendent of sewers whose duties shall include supervision of the sewerage system and the operation

of the sewage purification works; such operation to be at all times satisfactory to the State Board of Health; and,

8th. That this approval be void unless construction of the proposed sewerage system and sewage purification works shall have been commenced prior to April 1st, 1913.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Grube, Sutton and Hill.

In the negative, none.

It was moved by Dr. Hasencamp and seconded by Dr. Grube to approve the plans for sewage purification for The E. T. Collins Realty Subdivision, Toledo, providing the use of a septic tank at the outlet of the proposed sewer approved by the Board November 21st, 1911, with the following conditions:

1st. That the tank be abandoned and removed when connection with the city sewers shall become available;

2nd. That no discharge of sludge be permitted to reach the stream receiving the effluent; and,

3rd. That this approval be void unless construction of the proposed sewer and septic tank shall have been begun prior to September 1st, 1912.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Grube, Sutton and Hill.

In the negative, none.

The request of Mr. R. M. Pillmore, director of public service of Akron, of March 4th, for approval of the general plan for a proposed new water supply for that city as outlined and recommended in a report of the consulting engineers, Messrs. Frank A. Barbour and E. G. Bradbury, August 12th, 1911, was considered.

It was moved by Dr. Grube, and seconded by Dr. Sutton, to approve this general plan, which provides for the use of a supply from the Cuyahoga River drawn from an impounding reservoir some 1.5 miles above Kent, purified by mechanical filtration and supplied to the city through distributing reservoir, with the following conditions:

1st. That the entire contemplated improvements, including impounding reservoir, purification plant and distributing reservoir, be completed before the proposed new supply is placed in use; and that permission of the State Board of Health be obtained for temporary use of the supply prior to the completion of such improvements, should this be necessary or advisable;

2nd. That before contracts for the installation are awarded, detailed plans for the development of the proposed supply be submitted to and receive the approval of the State Board of Health; and,

3rd. That this approval be void unless such detailed plans shall have been submitted to the State Board of Health prior to January 1st, 1913.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Grube, Sutton and Hill.

In the negative, none.

The Acting Secretary was instructed to notify the authorities of Akron that this approval was not to be construed as an interference between the city of Akron and the Akron Water Works Company with respect to the purchase of the property of the water company.

It was moved by Dr. Sutton and seconded by Dr. Grube to approve the general plan for proposed sewerage for Oak Harbor, submitted by Mr. George Champe, consulting engineer, on December 7th, 1911, providing for the establishment of a submerged temporary outlet into the Portage River some 2750 feet east of the Locust Street bridge, with the following conditions:

1st. That a purification plant of a design satisfactory to the State Board of Health be installed when in the opinion of said Board such becomes necessary;

2nd. That detailed plans of the sewerage system, including man-holes, flush tanks, grades, sizes, and method of ventilation of the sewers; and location and construction of the outlet, be submitted to and receive the approval of the State Board of Health;

3rd. That there be appointed a sewer superintendent whose duty it shall be to keep accurate records of the sewer extensions and all connections to the sewers; and,

4th. That this approval be void unless detailed plans of the sewerage system shall have been submitted prior to August 1st, 1912, and construction shall have been begun prior to January 1st, 1913.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Grube, Sutton and Hill.

In the negative, none.

It was moved by Dr. Hasencamp and seconded by Dr. Grube to approve the plans and profiles for proposed sanitary sewers received February 12th and 21st, 1912, and the revised plans for sewage purification works received March 5th, 1912, prepared by Mr. John H. Holl, civil engineer of Canton, for the village of New Berlin with the following conditions:

1st. That the sewage purification works be completed before any connections to the proposed sanitary sewers are made;

2nd. That the sewage purification works be enlarged, altered, or repaired, when in the opinion of the State Board of Health such shall become necessary;

3rd. That samples of the filtering material be submitted to and receive the approval of the engineer of the State Board of Health;

4th. That detailed plans of the automatic dosing apparatus be submitted to the State Board of Health;

5th. That the village council appoint a superintendent of sewers who shall attend to the operation of the sewage purification works and have general supervision of the sewerage system; said superintendent to receive general instructions as to his duties from the State Board of Health; and,

6th. That this approval be void unless construction of the sewers and sewage purification works shall have been commenced prior to August 1st, 1912.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Grube, Sutton and Hill.

In the negative, none.

It was moved by Mr. Hill and seconded by Dr. Sutton to disapprove the plans for a proposed water supply for The Provident Coal Company and the community of Provident, near St. Clairsville, submitted February 27th, 1912, by Messrs. Kennon & Kennon, attorneys for the said company, the proposed supply to be obtained by impounding the flow of Jug Run and used in an unpurified state.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Grube, Sutton and Hill.

In the negative, none.

The Acting Secretary was instructed to notify the attorneys who submitted these plans, that if this is the only supply available, the Board would advise that detailed plans be submitted for the development of the supply, including a water purification plant to purify that portion to be used for general domestic purposes.

On motion of Mr. Hill, seconded by Dr. Grube, the monthly report of the Secretary was approved.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Grube, Sutton and Hill.

In the negative, none.

The Acting Secretary presented a list of health officers appointed by their respective councils to serve in lieu of a board of health.

It was moved by Dr. Grube and seconded by Dr. Sutton that these health officers be approved.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Grube, Sutton and Hill.

In the negative, none.

The Acting Secretary then presented the names of a number of health officers who had been appointed to serve in lieu of a board of health, but whose appointment had been protested.

It was moved by Mr. Hill and seconded by Dr. Grube that all protested appointments be referred to a standing committee to consist of Dr. Sutton and the Secretary.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Grube, Sutton and Hill.

In the negative, none.

The orders adopted by J. M. Van Fossan, health officer of East Palestine, were presented and, on motion of Dr. Grube, seconded by Mr. Hill, approved.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Grube, Sutton and Hill.

* In the negative, none.

Mr. Hill then made a statement in regard to the report of the epidemiologist relative to scarlet fever in Reading and vicinity, and moved (seconded by Dr. Grube), that the Acting Secretary be instructed to write a letter to all the physicians who failed to report their cases of scarlet fever, calling attention to their violation of the statutes and the penalty for such violation.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Grube, Sutton and Hill.

In the negative, none.

Dr. Sutton presented a request from the council of the city of Zanesville, asking the Board to advise the city relative to the installation of a new water supply.

On motion of Mr. Hill, it was voted to hold the next meeting of the Board in Zanesville, on the evening of April 11th, and that a meeting be arranged for 2 o'clock on the afternoon of that date, when the Board, sitting as a committee of the whole, would hear representatives of the city and advise in regard to this matter.

The president then appointed Dr. Sutton a committee to make the arrangements for such meeting.

On motion of Dr. Grube, seconded by Dr. Sutton, Dr. Hasencamp was appointed a special committee on Railroad sanitation.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Grube, Sutton and Hill.

In the negative, none.

Dr. Hasencamp presented a communication from Wm. H. Gould, County Sanitary Engineer, at Toledo, calling attention to the fact that sewers are being installed in an addition outside the city of Toledo.

The President, Dr. Warner, appointed Dr. Hasencamp a committee to investigate and report upon this matter.

The Acting Secretary presented a statement relative to the cost of printing in foreign languages the various pamphlets of the Board on the prevention of contagious and infectious diseases.

On motion of Dr. Sutton, seconded by Dr. Hasencamp, this matter was referred to a committee consisting of Mr. Hill and the Secretary with power to act.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Grube, Sutton and Hill.

In the negative, none.

The Acting Secretary presented a communication from the Surgeon General of the P. H. and M. H. S. relative to furnishing anti-rabic virus to the State Board of Health.

On motion of Dr. Sutton, seconded by Dr. Hasencamp, this matter was referred to a special committee consisting of Dr. Grube and Mr. Hill.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Grube, Sutton and Hill.

In the negative, none.

Dr. Hasencamp requested the Board to hold the June conference with representatives of boards of health of Northern Ohio in Toledo.

On motion of Dr. Grube, seconded by Mr. Hill, this matter was left to the President and Dr. Hasencamp.

Mr. Hill then offered a resolution instructing the Acting Secretary to convey to Mr. Hartzell the sympathy of the Board and the hope that his condition will improve and that he will soon be able to meet with the Board.

On motion of Dr. Sutton, this resolution was adopted, all voting in the affirmative.

The Board then adjourned.

Attest:

JAMES E. BAUMAN,
Acting Secretary.

Approved *April 11th, 1912.*

APRIL MEETING

1912

The State Board of Health met with members of the Chamber of Commerce and the city officials, in the Chamber of Commerce Building, Zanesville, April 11th, at 2 P. M., to consider the question of a public water supply for that city.

* * * *

The regular meeting of the State Board of Health was held at the Hotel Rogge, Zanesville, at 8 P. M., April 11th, 1912.

There were present Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Sutton.

On motion of Dr. Grube, seconded by Mr. Hartzell, the minutes of the March 21st, meeting were approved.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Sutton.

In the negative, none.

On motion of Mr. Hill, seconded by Mr. Hartzell, the report of the Finance Committee was approved; said report being a statement of expenditures from March 16th to and including April 15th, 1912, and balances on April 15th.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Sutton.

In the negative, none.

Dr. Warner, as chairman of the Executive Committee, reported having made several visits to the office, and other places, in regard to the moving of the departments to the Hartman Building, and also to consult with the Secretary and other employes regarding matters pertaining to the departments.

Mr. Hill, as Engineering Committee, presented his report on water and sewerage questions to be considered, and they were taken up and disposed of in the following order:

On motion of Dr. Grube, seconded by Dr. Sutton, the plans and specifications for the development of the proposed water supply for Malvern were approved; these plans having been submitted by Mr. L. E. Chapin, consulting engineer, March 16th and 18th, 1912, in compliance with the third condition of the Board's approval of the proposed water supply March 21st, 1912.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Sutton.

In the negative, none.

The Acting Secretary was instructed to call the attention of the authorities to the following recommendations made to the consulting engineer:

(1) That the plans and specifications for pumping machinery should include provision for facilities for measuring the quantity of water pumped; and,

(2) That means should be provided for draining the standpipe incident to cleaning, and that for this purpose a blow-off connection from the 8-inch pipe leaving the standpipe should be made.

The site proposed for the location of public water supply wells for the village of Baltic was taken up for consideration.

On motion of Dr. Sutton, seconded by Dr. Grube, the site situated 800 feet south of the southerly corporation line of the village and immediately east of Ray Street extended, was approved subject to the following conditions:

1st. That the supply be derived from drilled wells obtaining their water at a depth of at least 50 feet;

2nd. That the quality and quantity of water available, as demonstrated by a test well, be satisfactory to the State Board of Health;

3rd. That an area of at least 0.5 acre be purchased for water supply purposes;

4th. That before contracts for the installation are awarded, plans for the development of the supply be submitted to and receive the approval of the State Board of Health; and,

5th. That this approval be void unless a test well shall have been drilled and plans submitted prior to August 1st, 1912.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Sutton.

In the negative, none.

The plans for a proposed sewer and sewage disposal for the Muskingum County Children's Home, submitted by Mr. W. V. Hollingsworth, county surveyor, March 18th, 1912, were then considered, and on motion of Dr. Sutton, seconded by Mr. Hartzell, approved subject to the following conditions:

1st. That the proposed septic tank be completed and ready for operation before sewage is discharged into the proposed sewer;

2nd. That the existing cesspool be cleaned, disinfected, and filled with earth or ashes, as soon as the proposed sewer is completed;

3rd. That secondary devices for more complete purification of the sewage be installed whenever deemed necessary by the State Board of Health;

4th. That the sludge from the septic tank be discharged only during high stages of the stream;

5th. That no additional connections to the proposed sewer outside the grounds of the institution be made without permission from the State Board of Health; and,

6th. That this approval be void unless construction shall have been begun prior to October 1st, 1912.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Sutton.

In the negative, none.

The Acting Secretary was instructed to advise the county surveyor that the design of the septic tank should preferably provide a lesser width and greater length than that shown on the plans, and that revised plans of the tank should be furnished the State Board of Health if this suggestion is followed.

The plan for enlargement of the water purification plant of The Conneaut Water Company at Conneaut, submitted March 21st, 1912, by Messrs. Burgess and Long, consulting engineers, was considered.

On motion of Mr. Hartzell, seconded by Dr. Grube, approval was withheld until such time as detailed plans have been submitted for loss of head gages, rate controllers and devices for measuring the amount of water filtered, and samples of the sand to be used in the filters have been submitted to and received the approval of the chief engineer.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Sutton.

In the negative, none.

The question of the necessity of purifying the public water supply at Struthers and East Youngstown was taken up, and it was reported that examinations of this water supply (obtained from Hamilton Lake) made May 3rd and June 13th, 1911, and March 20th, 1912, showed that the water is of unsatisfactory quality for domestic use; and, to conform to the fourth condition of the Board's approval of the supply given November 15th, 1905, the Board should require that at least that portion of the supply which is used for domestic purposes be purified.

Mr. Hill stated that the Secretary had been instructed to request the presence of representatives of the company at this meeting, to show cause why the company should not be required to install purification works for that part of the water supply used for domestic purposes, and that Mr. M. E. McCaskey, the general manager, and Mr. Wise, the chief engineer of the company, were present and would be heard later.

The Board then took up the request of the director of public service of Bellefontaine, Mr. John Weidinger, that certain changes be permitted in the construction of the sewage purification plant for that city.

On motion of Mr. Hartzell, seconded by Dr. Grube, it was voted to rescind the first condition of the Board's approval of the plans for the sewage purification plant for Bellefontaine given June 30th, 1910, and to substitute in place thereof the following condition:

1st. That two acres of intermittent sand filters be constructed for final treatment of the contact filter effluent prior to October 1st, 1914, unless future examinations by the State Board of Health demonstrate that such construction is unnecessary; provided, that should the present disposal works not produce a non-putrescible effluent or an effluent which will be innocuous with respect to health, then the city will at once add the proper devices to treat the sewage with hypochlorite of lime or sodium in a manner to eliminate the pathogenic and fermentative organisms from the effluent before it is discharged into Possum Run.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Sutton.

In the negative, none.

The question of proposed sanitary sewers for Arlington Heights was taken up, and on motion of Dr. Grube, seconded by Mr. Hartzell, the plans and specifications for a proposed system of sanitary sewers, submitted by Mr. H. C. Innes of Hartwell, consulting engineer for the village, March 26th, 1912, were approved subject to the following conditions:

1st. That the outlet proposed to be located on the east bank of the west fork of Mill Creek 150 feet below the Elliott Avenue bridge, be located at a point at least 150 feet further downstream;

2nd. That the village install intercepting sewers or sewage purification works, or both, when in the opinion of the State Board of Health such sewers or works shall be considered necessary; and,

3rd. That this approval be void unless contracts for the construction of the proposed sewers shall have been made prior to September 1st, 1912.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Sutton.

In the negative, none.

The question of approving plans for a system of sanitary sewers for a district in the northern portion of the city of Hamilton, submitted by Mr. F. E. Weaver, city engineer, March 25th, 1912, was taken up.

It was moved by Dr. Grube and seconded by Mr. Hartzell to adopt the recommendation of the Engineering Committee that the matter be further investigated with respect to the necessity of an intercepting sewer on the west side of the Great Miami River in Hamilton, and of the necessity of devising at this time a plan whereby all the sewage may be brought to one point for treatment, and action on the plans to be deferred until the next meeting of the Board, May 9th, 1912.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Sutton.

In the negative, none.

The plans for a proposed system of combined sewers for Bremen, submitted by E. R. Johnson, engineer for the village; March 27th, 1912, were considered, and on motion of Dr. Warner, seconded by Dr. Grube, the same were disapproved.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Sutton.

In the negative, none.

The Acting Secretary was instructed to send a copy of the report of the chief engineer upon these plans to the mayor and council of Bremen, and to state that the Board will require that sanitary sewers be constructed in place of the combined sewers proposed, and that plans for a comprehensive system of sanitary sewers be submitted to the Board for approval as soon as such plans can be prepared.

The plans for proposed sewerage and sewage purification for the Lima State Hospital, submitted by E. G. Bradbury, consulting engineer, April 1st, 1912, were taken up for consideration.

It was moved by Dr. Sutton and seconded by Dr. Warner to approve these plans subject to the following conditions:

1st. That the sewage purification plant be constructed and ready for operation before connections to the proposed sewers are made;

2nd. That the plant be altered, enlarged, or repaired, whenever in the opinion of the State Board of Health such alteration, enlargement, or repairs become necessary;

3rd. That in case broken stone is used as a filtering material in the contact filters, sand be used as a filtering material in the intermittent filters;

4th. That samples of all filtering material be submitted to and receive the approval of the engineer of the State Board of Health;

5th. That detailed plans of the automatic controlling apparatus be submitted to the State Board of Health, and that its operation be at all times satisfactory to said Board; and,

6th. That this approval be void unless contracts for the construction of the sewers and sewage purification plant shall have been awarded prior to October 1st, 1912.

And to recommend that the consulting engineer be advised as follows:

(1) That the false bottom of the sedimentation compartment of the tank should be placed at the depth provided in the design for the ultimate population: and,

(2) That screened cinders should be given preference over broken stone as filtering material in the contact beds.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Sutton.

In the negative, none.

Mr. Hill, as chairman of the special committee appointed to investigate location for sewage purification works and water supply at Canton, reported that the committee had met at Canton April 8th, for consideration of the matters referred to it, and would present a report at the next meeting.

There being no objection, the committee was continued.

The special committee, Dr. Grube and the Acting Secretary, submitted the following report on a Tuberculosis Exhibit:

To the Members of the State Board of Health:

"Your committee appointed to consider the question of a tuberculosis exhibit and also to consider the project of installing a general health exhibit met at the office of the Secretary on April 2nd, with Mr. Robert G. Paterson, executive secretary of the Ohio Society for the Prevention of Tuberculosis.

"After a discussion of the nature and scope of the tuberculosis exhibit and an inquiry into the amount of money necessary for the installation of an appropriate exhibit, your committee is of the opinion that, while an exhibit would be of great benefit to the state, it is impossible at present to collect such an exhibit because of lack of funds which could be used for such purpose."

On motion of Mr. Hill, seconded by Dr. Hasencamp, this report was approved.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Sutton.

In the negative, none.

The Acting Secretary presented a list of health officers who had been appointed by their respective councils to serve in lieu of a board of health.

It was moved by Mr. Hill and seconded by Mr. Hartzell to approve these health officers.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Sutton.

In the negative, none.

Dr. Hasencamp, as a special committee, made the following report:

"To the Ohio State Board of Health:

"GENTLEMEN:—I hereby report the following in regard to sewer to be constructed in Melwood, an addition or sub-division in Washington Township, Lucas County, Ohio. This property is owned by Pugh and Pugh and Raker of Toledo, Ohio, C. A. Raker of Toledo acting as engineer.

"I visited the site and found that the vitrified pipe for the sewer was already on the ground and was informed that the only reason the ground was not broken was on account of the ice and frost. I later called up Mr. C. A. Raker, and informed him that he must comply with the law and submit plans before they could put in any sewers and not be liable. He said he would submit plans."

On motion of Mr. Hill, seconded by Dr. Sutton, this report was approved.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Sutton.

In the negative, none.

The standing committee, Dr. Sutton and the Acting Secretary, presented the following report:

"To the Members of the State Board of Health:

"Your standing committee to consider the approval of health officers where protests have been registered, held a meeting in the office of the Secretary on Thursday, April 4th, and considered the approval of health officers for the following places:

"Lisbon, New Vienna, Osnaburg, St. Clairsville and Savannah.

"After considering all of the information available, we are of the opinion that in no case was there sufficient evidence filed with the Board to warrant the disapproval of the appointment of the health officers mentioned below:

James Stackhouse, Lisbon.

Dr. E. W. Brown, New Vienna.

Joseph Davenport, Osnaburg.

Dr. S. L. West, St. Clairsville.

Simon Stahl, Savannah.

"We, therefore, recommend that the Board approve these appointments."

It was moved by Mr. Hill and seconded by Dr. Grube to approve this report.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Sutton.

In the negative, none.

The report of the State Inspector of Plumbing was presented and on motion of Mr. Hill, seconded by Dr. Sutton, approved.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Sutton.

In the negative, none.

Dr. Grube presented the following report for the special committee consisting of Dr. Grube and Mr. Hill:

"The State Board of Health.

"GENTLEMEN:—Your committee appointed to consider the request of the health department of Cincinnati to assist them in securing anti-rabic material from the Public Health and Marine Hospital Service would respectfully report and recommend that, if the health department of Cincinnati can satisfy the Board that they can prepare and distribute the treatments in the proper manner, their request be granted."

It was moved by Dr. Sutton and seconded by Mr. Hartzell to approve this report.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Sutton.

In the negative, none.

Dr. Hasencamp reported that the committee to whom the matter was referred had decided to hold the regular meeting of the Board June 19th, and the conference with representatives of boards of health of northern Ohio on June 20th and 21st, in Toledo.

It was moved by Mr. Hill and seconded by Dr. Grube to hold said meetings on the dates named.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Sutton.

In the negative, none.

Dr. Warner, as a committee appointed to select quarters for the various departments, reported that, the Emergency Board having allowed a sufficient appropriation to enable the consolidation of the departments, quarters had been selected on the third and fourth floors of the Hartman Building. He further stated that the equipment of the new quarters would require the expenditure of considerable money and asked the pleasure of the Board in regard to this expenditure.

On motion of Mr. Hill, seconded by Dr. Sutton, the President, Acting Secretary and Dr. Grube were appointed a committee on the equipment of the new quarters.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Sutton.

In the negative, none.

The Acting Secretary, as a member of the committee, made a report of progress on the question of printing in foreign languages the various circulars on the prevention of contagious and infectious diseases. There being no objection, the committee was continued.

Upon request of the President, the Acting Secretary read a letter from the Surgeon General calling attention to the Tenth Annual Conference of State and Territorial Health Authorities with the Public Health and Marine-Hospital Service to be held in Washington, D. C., June 1st, 1912.

On motion of Dr. Grube, seconded by Dr. Sutton, Mr. Hill was appointed a delegate to attend this conference; the President being authorized to appoint an alternate should this become necessary.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Sutton.

In the negative, none.

The Secretary's monthly report for April was presented, and on motion of Dr. Hasencamp, seconded by Mr. Hill, approved.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Sutton.

In the negative, none.

The Acting Secretary presented the following list of applicants for license to conduct a maternity boarding house in the city of Cleveland:

Joanna P. Ortlieb, 933 East 78th Street, for 6 women and 8 children.

*Amelia Eble, 4720 Ravine Av., S. W., for 2 women and 4 children.

*Salvation Army Maternity Hospital, 5905 Kinsman Road, for 5 women and 11 children.

*Mrs. Ida Josephine Dewey, 7804 Kinsman Road, for 2 women and 4 children.

*St. Ann's Infant Asylum and Maternity Hospital, 3409 Woodland Avenue, for 108 women, or 232 children.

It was moved by Mr. Hill, seconded by Dr. Grube, that these licenses be granted.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Sutton.

In the negative, none.

Mr. Hill made a statement in regard to the sections of the Bense Act providing for arbitration where the findings of the State Board of Health are disputed.

On motion of Dr. Grube, seconded by Dr. Sutton, it was voted to refer this matter to Mr. Hill and the Acting Secretary with instructions to make inquiry as to any method that could be pursued to secure a change in the act.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Sutton.

In the negative, none.

On motion of Mr. Hill, seconded by Dr. Sutton, the Acting Secretary was instructed to take up the question of holding the July meeting in Cleveland with Dr. Miller, and report at the next meeting.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Sutton.

In the negative, none.

Dr. Sutton brought up the question of enforcing the order of the Board under the Bense Act, issued March 20th, 1911, requiring the city of Zanesville to secure a new source of public water supply and place the same in use by January 1st, 1912; or install and place in operation water purification works, satisfactory to the State Board of Health, to purify the present supply, by January 1st, 1912.

Dr. Sutton suggested that the time for complying with this order be extended to January 1st, 1913.

* Renewal.

On motion of Dr. Sutton, seconded by Mr. Hill, it was voted to extend the time to January 1st, 1913, and to require that definite plans for the improvement of the water supply of Zanesville be submitted to the State Board of Health before the regular meeting of the Board to be held July 18th, 1912.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Sutton.

In the negative, none.

Mr. McCaskey, general manager, and Mr. Wise, chief engineer, for The Mahoning Valley Water Company, appeared before the Board in response to a citation issued by the Secretary to show cause why the State Board of Health should not require the purification of that part of the water supply at Struthers and East Youngstown used for domestic purposes. After hearing the opinion of the Board in regard to the necessity of purifying this water supply, they agreed to have plans for such purification prepared.

On motion of Mr. Hill, seconded by Dr. Sutton, it was voted to require that plans for the purification of this water supply be prepared and submitted for consideration by the Board at its meeting to be held June 19th, 1912, the Secretary to notify Mr. McCaskey of the place of said meeting.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Sutton.

In the negative, none.

The Acting Secretary was instructed to call the attention of The Mahoning Valley Water Company to its violation of Section 1240 of the General Code, in providing a public water supply to the village of East Youngstown without having first obtained the approval of the State Board of Health, and to say that application for such approval should be made at once.

The Board then adjourned, to meet in Dayton on Thursday evening, May 9th, 1912.

Attest:

JAMES E. BAUMAN,
Acting Secretary.

Approved May 9th, 1912.

MAY MEETING

1912

A regular meeting of the State Board of Health was held at the Algonquin Hotel, Dayton, Thursday evening, May 9th, 1912, at 8 o'clock.

There were present Messrs. Warner, Hasencamp, Hartzell, Grube, Hill, Sutton and Miller.

On motion of Mr. Hartzell, seconded by Dr. Sutton, the minutes of the April meeting were approved.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill, Sutton and Miller.

In the negative, none.

On motion of Mr. Hill, seconded by Mr. Hartzell, the monthly report of the Secretary was approved.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill, Sutton and Miller.

In the negative, none.

Mr. Robert H. Hoffman, city engineer, and Mr. R. Winthrop Pratt, consulting engineer, appeared before the Board in reference to sewerage conditions at Cleveland, and Mr. Hoffman made the statement that a preliminary investigation had shown that it would be necessary to install three purification plants, one for the West Side, one at the present outlet, and one up the Cuyahoga River. The Board was requested to appoint a committee to consider this matter and to receive communications in regard thereto.

On motion of Dr. Hasencamp, seconded by Dr. Sutton, the president was authorized to appoint such committee; all present voting aye.

The President appointed Dr. Miller and Mr. Hill as members of this committee.

Dr. Grube brought up the question of the recent outbreak of small-pox in Dayton, and stated that he had requested Dr. Welliver, president pro tem. of the board of health, to be present and inform the Board of present conditions.

Dr. Welliver then made a statement in regard to the recent outbreak and the reasons for the outbreak having reached the proportions which it did. This was due to failure to recognize the early cases; failure to call a physician in a number of cases, and to the anti-vaccination sentiment which is more than usually strong in Dayton. He stated

that there had been 132 cases of smallpox, only one case being in a person who had ever been vaccinated.

There are but two cases in the city at the present time and these are to be discharged within a few days.

Mr. C. D. Crouch of Chicago, representing The Public Service Finance Corporation, and Mr. C. C. Benner of Akron, attorney for said corporation, appeared before the Board in reference to the construction of a plant for the disposal of the sewage, garbage, and night soil at Akron.

Mr. R. M. Pillmore, director of public service at Akron, was present and stated that the city desired the State Board of Health to accept the plans as presented by Mr. Crouch.

This matter was referred to executive session.

The Board then went into executive session.

On motion of Dr. Grube, seconded by Dr. Miller, the report of the Finance committee, giving expenditures from April 16th to and including April 30th, 1912, and statement of balances on April 30th, 1912, was approved.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill, Sutton and Miller.

In the negative, none.

Mr. Hill offered the report of the Executive Committee, signed by Dr. Warner and himself, which was as follows:

'Owing to the hard use of the typewriters in the engineering department it became necessary to have them completely overhauled and repaired. The Underwood Typewriter Company presented an estimate of \$10.40 and \$9.80 for the repair of the two machines. At the same time it was proposed by the company to furnish a new machine in exchange for one of the old ones and repair the other, at a total cost of \$43.03. This will include a guarantee of the new machine for one year, a pad for the machine, and other minor accessories. It will be noted by this arrangement that a new machine may be secured for the department by the expenditure of \$22.83 in excess of that required for the repair of the machines now in use. The price of a new machine with the customary discount is \$83.03.

"It is therefore recommended that this offer of the typewriter company to repair one old machine and exchange the other for a new one at a cost of \$43.03 be accepted."

"It is also recommended that the two supply cabinets in the engineering department be repaired and refinished, at a cost of \$25.00."

It was moved by Mr. Hill and seconded by Dr. Miller to approve the above report.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill, Sutton and Miller.

In the negative, none.

Mr. Hill then presented his report, as Engineering Committee, and the matters were taken up in the following order:

The preliminary plans for proposed water supply for Swanton, submitted by Mr. George Champe, of Toledo, consulting engineer, on April 26th, 1912, were considered.

On motion of Dr. Grube, seconded by Dr. Sutton, it was voted to approve the recommendation of the Engineering Committee, which was to defer action upon the proposition until the Board is furnished with data showing the available yield of the proposed source of supply, and to notifying the village authorities that the use of the supply will require the installation of a water purification plant, and in order to expedite matters complete detailed plans for the development of the supply including a purification plant should be submitted with the data required.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill, Sutton and Miller.

In the negative, none.

It was moved by Dr. Sutton and seconded by Dr. Miller to approve the proposed water supply for Worthington, to be obtained from wells drilled on a site located 1700 feet west of the westerly corporation line of the village and immediately north of the Dublin and Worthington Pike, as described in a request received from Mr. G. H. Pagels, mayor, on May 3rd, 1912, subject to the following conditions:

1st. That before contracts for the installation of the supply are awarded, complete detailed plans of the development be submitted to and receive the approval of the State Board of Health;

2nd. That an area of at least one acre be acquired for water supply purposes;

3rd. That the village council pass an ordinance preventing the establishment of privy vaults, cesspools, or other sources of contamination within 1000 feet of any of the public supply wells; said ordinance to be approved by the Secretary of the State Board of Health before its passage; and,

4th. That this approval be void unless the proposed supply shall have been installed prior to January 1st, 1914.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill, Sutton and Miller.

In the negative, none.

The proposed new water supply for the Scioto County Infirmary, near Portsmouth, to be obtained from a drilled well 75 feet in depth and located 150 feet northwest of the main building of the institution was considered.

On motion of Dr. Hasencamp, seconded by Dr. Grube, it was voted to withhold the Board's approval, analysis of the water from the proposed source of supply showing an abnormal chlorine content, indicative of salt contamination; and to advise the superintendent of the institution

that steps should be taken to obtain a supply free from this objection, either by securing a new location for a well or by preventing the entrance of the salt water into the existing well.

Those voting in the affirmative were Messrs, Warner, Hasencamp, Hartzell, Grube, Hill, Sutton and Miller.

In the negative, none.

It was moved by Dr. Sutton and seconded by Dr. Hasencamp to approve the proposed additional water supply for Chagrin Falls to be obtained from springs located on the so-called Lydia B. Milks property, situated immediately south of the present water works property, as described in the communication received from Mr. H. B. Pugsley, village clerk, on April 29th, 1912, subject to the following conditions:

1st. That before development of the proposed additional supply, plans showing the location of the springs, the method of protecting the springs, and means of conveying the water to the collecting well, be submitted to and receive the approval of the State Board of Health; and,

2nd. That this approval be void unless said plans shall have been submitted to the State Board of Health prior to September 1st, 1912.

Those voting in the affirmative were Messrs, Warner, Hasencamp, Hartzell, Grube, Hill, Sutton and Miller.

In the negative, none.

It was moved by Dr. Grube and seconded by Dr. Sutton to approve the proposed increase in the water supply for Jefferson, as shown on plans submitted by Mr. B. F. Hewit, consulting engineer, March 18th and April 9th, 1912, subject to the following conditions:

1st. That in those portions of the reservoir having a depth of less than 5 feet, the ground to be flooded shall be stripped of vegetation and soil to a depth of at least 6 inches; and,

2nd. That the reservoir be surrounded with a substantial fence placed at least 6 feet from the water's edge.

And to advise the village officials and the consulting engineer:

(1) That the section of the dam should be enlarged according to the original plan of the consulting engineer, submitted April 9th, 1912, and that the modification of this plan omitting that portion of the new concrete construction on the upstream side of the dam, will cause a weakness in the structure; and,

(2) That it will be economical and beneficial to the quality of the supply to remove from the area of the reservoir by diking, several arms which will be flooded to a depth of about one foot.

Those voting in the affirmative were Messrs, Warner, Hasencamp, Hartzell, Grube, Hill, Sutton and Miller.

In the negative, none.

It was moved by Dr. Miller and seconded by Dr. Grube to approve the plans for a proposed water supply for The Provident Coal Company and the community of Provident, near St. Clairsville, to be obtained by

impounding a small tributary of Jug Run, received February 27th, 1912, and the general plans for a purification plant to purify that portion of the supply to be used for general domestic purposes, received April 29th, 1912, subject to the following conditions:

1st. That before the construction of the plant is begun, complete detailed plans for the entire plant be submitted to and receive the approval of the State Board of Health;

2nd. That samples of the filtering material be submitted to and approved by the engineer of the State Board of Health;

3rd. That the Provident Coal Company employ an operator whose only duties shall include the operation of the water purification plant and care of the water supply; and,

4th. That the plant be installed before water from the proposed supply is furnished for domestic use;

And that the owners of The Provident Coal Company, Messrs. Pickands, Mather & Company of Cleveland, be advised that in the foregoing approval it is to be understood that only the general project of installing a water purification plant of 100,000 gallons capacity is approved, and that none of the details of said plant can be approved until detailed plans are submitted.

Those voting in the affirmative were Messrs, Warner, Hasencamp, Hartzell, Grube, Hill, Sutton and Miller.

In the negative, none.

It was moved by Dr. Miller and seconded by Mr. Hartzell to hold in abeyance approval of the use of calcium hypochlorite to treat that portion of the water supply of Canton obtained from the west branch of Nimishillen Creek via the water works race, but to permit its temporary use at all times when the race water is used in emergency, until October 1st, 1912, pending the installation of an additional well supply;

And to approve the proposed additional water supply for Canton to be obtained from drilled wells some 335 feet deep, located north of McDonald Avenue between the Wheeling and Lake Erie Railroad and the middle branch of Nimishillen Creek, as shown on a plan received April 13th, 1912, subject to the following conditions:

1st. That no well be located within 500 feet of any cesspool, privy vault, or other source of pollution, and that the council pass an ordinance preventing the future establishment of any such pollution influence within 500 feet of any well, said ordinance to be approved by the Secretary of the State Board of Health before its passage; and,

2nd. That the proposed additional supply be installed and placed in use prior to October 1st, 1912;

Also that the authorities be advised:

(1) That the installation of the additional water supply approved above cannot be considered as a permanent solution of the problem of the future water supply of the city;

(2) That the Board will expect that the results of such study, with a definite plan of procedure adopted by the city, will be submitted to the State Board of Health for approval prior to May 1st, 1913.

Those voting in the affirmative were Messrs, Warner, Hasencamp, Hartzell, Grube, Hill, Sutton and Miller.

In the negative, none.

It was moved by Dr. Miller and seconded by Dr. Grube, to sustain the Board's former action of October 18th, 1911, approving a proposed site for a sewage purification plant for the city of Canton, as shown on a plan submitted by Mr. Ray F. Harbert, director of public service, October 7th, 1911, the said site being located three miles south of the center of the city, subject to the conditions that this approval shall become void unless a sewage purification plant of a design satisfactory to the State Board of Health shall have been constructed prior to January 1st, 1914;

And to advise the city officials, and the complainants, that the site located in the valley of Nimishillen Creek six miles south of the center of the city is satisfactory, and the selection of this site or the one approved October 18th, 1911, must be determined by a study on the part of the local officials of the relative desirability of each site.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill, Sutton and Miller.

In the negative, none.

It was moved by Dr. Sutton and seconded by Dr. Miller to approve the plans for a proposed enlargement of the sewage purification plant at Ashland, submitted by Mr. T. Brindle, city engineer, on April 16th, 1912, subject to the following conditions:

1st. That a suitable roof or cover be placed on the proposed new septic tanks;

2nd. That an area of at least 0.23 acre be provided for the draining and drying of sludge; and,

3rd. That this approval shall be void unless the proposed enlargement shall have been made prior to November 1st, 1912;

And to advise the consulting engineer:

(1) That suitable baffles should be provided to distribute the flow in the tanks.

(2) That to facilitate sludge removal, it may be necessary to provide drains leaving the central portion as well as the inlet end of each tank, and that connections for such drains should be included in the design.

(3) That plans showing these changes should be filed with the engineer of the State Board of Health.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill, Sutton and Miller.

In the negative, none.

It was moved by Mr. Hill and seconded by Dr. Sutton, to disapprove the proposed sewerage and sewage purification for the Kirtland Farm near Poland, contemplating the discharge of the effluent into Yellow Creek above Poland, as shown on a plan received March 19th, 1912, from Mr. George E. Rose, president of The Realty Security Co.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill, Sutton and Miller.

In the negative, none.

The Board then considered the plans of proposed locations for sewage purification works for the Kirtland Farm near Poland, received May 6th, 1912, from Mr. R. Winthrop Pratt, consulting engineer, and the same were referred to the Engineering Committee with power to act.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill, Sutton and Miller.

In the negative, none.

(The Committee took the following action, and the Realty Security Company of Youngstown, owners of this sub-division, were so notified May 10th, 1912:

1st. To disapprove Site A. as a location for sewage purification works;

2nd. To approve Site B. as a location for sewage purification works providing a plant including intermittent filters for final treatment be installed; and,

3rd. To approve Site C. as a location for sewage purification works providing a plant including intermittent filters or contact filters for final treatment be installed.)

It was moved by Dr. Grube and seconded by Dr. Miller, after reconsidering the Board's former action (September 14th, 1911), disapproving proposed sewerage for District No. 4, at Canton, as shown on plans submitted by Mr. P. H. Weber, city engineer, August 16th, 1911, to approve the same subject to the following conditions:

1st. That before connections to the proposed sewers are made, complete detailed plans for a new sewage purification plant be submitted to and receive the approval of the State Board of Health;

2nd. That the new sewage purification plant be completed and placed in operation prior to January 1st, 1914; and,

3rd. That this approval be void unless complete detailed plans for a new sewage purification plant shall have been submitted to the State Board of Health prior to September 1st, 1912.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill, Sutton and Miller.

In the negative, none.

Mr. Hill presented a communication from Mr. J. A. Stewart, of Cincinnati, consulting engineer for the village of Kennedy Heights, requesting permission to connect with the sewer under construction the

waste water drains which now discharge into the street gutters, and thus convey this waste through the sewer to a point in the isolated creek near the location of the proposed sewage disposal plant.

It was moved by Dr. Grube and seconded by Dr. Miller that this permission be granted.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill, Sutton and Miller.

In the negative, none.

The plans for a system of combined sewers for Bedford, submitted by Mr. C. W. Courtney of Cleveland, consulting engineer, April 22nd, 1912, were taken up for consideration and, on motion of Dr. Grube, seconded by Dr. Hasencamp, approval was withheld, the Board being of the opinion that where purification of the sewage is required, it is advisable to install a separate system of sewers.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill, Sutton and Miller.

In the negative, none.

The Acting Secretary was instructed to advise the authorities that if, however, the village desires to install a combined system of sewers, it will be necessary to provide the following features:

1st. Means for adequate flushing of the sewers to prevent the standing of solid matter; and,

2nd. Revision in the design of the main or intercepting sewer leading to the purification works according to one of the following plans:

(a) By adapting the capacity of the intercepting sewer or sewers to carry only the dry weather flow of sewage so that any flow in excess of this, during periods of considerable rainfall, will go directly through the proposed overflows into the ravines connecting with Tinker's Creek; or,

(b) By installing an additional overflow at the purification works in order that the works may not be overflowed in times of floods, this overflow to be provided in case the capacity of the intercepting sewers is equivalent to that of a pipe 18 inches in diameter, or larger; or

(c) By designing the main intercepting sewers with such capacity as to carry the maximum sewage flow and compel the discharge of all additional flow through an overflow into Tinker's Creek. Also that the Board will consider revised plans prepared in accordance with the foregoing advice.

Mr. Hill stated that his attention had been called to the Seventh Annual Meeting of the American Society of Inspectors of Plumbing and Stationary Engineers to be held in St. Louis, June 4th, 5th, and 6th, 1912, and that it had been suggested that the State Inspector of Plumbing attend this conference in the interest of the plumbing regulations of the State.

Mr. Hill recommended that the former policy of the Board be adhered to, namely, that no member of the staff be sent out of the State except for the purpose of collecting information that could not be obtained in any other way.

It was moved by Dr. Grube and seconded by Dr. Miller that this recommendation be approved.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill, Sutton and Miller.

In the negative, none.

The Engineering Committee presented communications from the board of health of Ironton, to the Governor and to the State Board of Health, relative to deaths in Ironton from typhoid fever since January 1st, 1912, and asking that immediate steps be taken towards securing an improved water supply.

The following resolution was then offered by Mr. Hill:

WHEREAS, The quality of water supplied to the city of Ironton is well known to be unfitted for drinking, and some other domestic purposes, consisting as it does of unpurified sewage polluted Ohio River water, which is unfitted in its natural state for domestic use; and,

WHEREAS, The officials of Ironton have been before the Board repeatedly upon the question of an improvement in the city's water supply and have been warned by the Board that the present supply is unsatisfactory, is dealing death and destruction to the population of the city, and that present conditions can no longer be tolerated;

Therefore be it resolved. That the officials of Ironton be directed to come before the State Board of Health at or before its regular meeting to be held July 18th, 1912, with a definite plan for improvement of the public water supply to a standard which will satisfy the requirements of good sanitation.

On motion of Dr. Sutton, seconded by Dr. Grube, the above resolution was unanimously adopted.

Mr. Hill recommended that no action be taken in reference to the proposed installation of a disposal process for sewage, garbage and night soil at Akron, until such time as the officials of the city present to the Board an application for approval of said process accompanied by a report of some experienced, reliable engineer, who has carefully considered the matter, acting in an independent capacity in behalf of the city of Akron.

On motion of Dr. Miller, seconded by Dr. Grube, this recommendation was adopted.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill, Sutton and Miller.

In the negative, none.

Mr. Hill called attention to the fact that the National Tube Company had presented several communications, asking for a construction of that part of the new State Plumbing Code which mentions the use of

"wrought iron pipe," claiming that in many cases there is an indiscriminate use of wrought iron and steel pipe; that wrought iron pipe is not now largely used in sanitary plumbing, and that by the literal construction of the code the use of steel pipe is to be excluded in this state.

Mr. Hill stated that knowing the contention of the National Tube Company to be correct, he recommended that the State Inspector of Plumbing be directed to submit a compilation from the various building codes of the older cities and states with respect to the use of wrought iron and steel pipe for connecting up sanitary plumbing, in order that the board may have more light upon this matter than is conveyed by the code itself.

On motion of Dr. Grube, seconded by Dr. Miller, this recommendation was adopted.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill, Sutton and Miller.

In the negative, none.

On motion of Dr. Grube, seconded by Dr. Miller, it was voted to appoint Dr. J. H. Landis, health officer of Cincinnati, as an agent of the Board to receive from the United States and Public Health and Marine Hospital Service at Washington, D. C., material for anti-rabic treatment.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill, Sutton and Miller.

In the negative, none.

The Acting Secretary presented a list of health officers who had been appointed by council to serve in lieu of a board of health, endorsed by five property holders of their respective villages, and approved by the president of the medical society of the county in which they reside.

On motion of Dr. Grube, seconded by Dr. Miller, these health officers were approved.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill, Sutton and Miller.

In the negative, none.

It was moved by Dr. Grube, and seconded by Dr. Miller that the Secretary be directed to call the attention of the mayor of the city of Hamilton, and of the city of Newark, to the fact that the law required the appointment of a board of health and that this Board would expect that such a board be organized; and that if such a board is not appointed, a health officer will be appointed by the State Board of Health, as authorized in Section 4405 of the General Code.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill, Sutton and Miller.

In the negative, none.

The application of Sarah Murray to conduct a maternity boarding house at 6507 Grand Avenue, Cleveland, was presented.

On motion of Dr. Miller, seconded by Dr. Sutton, it was voted to not grant this license on account of a deficiency in the light and ventilation.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill, Sutton and Miller.

In the negative, none.

The application of Mrs. Jennie K. Barnes to conduct a maternity boarding house and lying-in hospital in Huntsburg, Geauga County, was presented.

On motion of Dr. Miller, seconded by Dr. Grube, it was voted to grant this license, permitting only two women or four children to be kept in said hospital.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill, Sutton and Miller.

In the negative, none.

The following applications for renewal of their licenses to conduct a maternity boarding house were presented.

Mrs. Minnie Braessler, at 6401 Lexington Avenue, Cleveland, permitting but nine children to be kept at one time.

Mrs. Lida M. Bowers, at 2302 Cherry Street, Toledo, permitting six women and fourteen children to be kept in said hospital.

It was moved by Dr. Miller and seconded by Dr. Grube to grant a renewal of these licenses.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill, Sutton and Miller.

In the negative, none.

Dr. Sutton presented the matter of the construction of a mausoleum at Zanesville.

On motion of Mr. Hill, seconded by Dr. Grube, Dr. Sutton was appointed a special committee to investigate the manner of construction and operation of this building.

The Acting Secretary was directed to request the director of public service of Dayton to furnish a statement as to what steps have been taken in the proposed improvement and enlargement of the public water supply, and to inform him that the Board would expect to receive this statement, accompanied with such data as may have been secured, in time for consideration at its next meeting, to be held June 19th, 1912.

The Board then adjourned.

Attest:

JAMES E. BAUMAN,
Acting Secretary.

Approved June 19, 1912.

JUNE 19th MEETING

1912

A regular meeting of the State Board of Health was held at the Hotel Secor, Toledo, Wednesday evening, June 19th, 1912, at 8 o'clock.

There were present Messrs. Warner, Hasencamp, Grube, Hartzell, Hill and Miller.

A delegation from Cleveland was present.

Dr. C. E. Ford, secretary of the board of health of Cleveland, presented a petition, citing a resolution adopted by that board on June 10th, 1912, relative to the pollution of the Cuyahoga River.

Mr. W. J. Springborn, director of public service, presented the following resolutions adopted by the city council on June 17th:

WHEREAS, The plan originally adopted for the route of the intercepting sewer of the city of Cleveland, provided that the sewage from the entire city was to be discharged untreated into Lake Erie at the easterly end of the city; and,

WHEREAS, Since the adoption of said plan local conditions have changed in the vicinity of said sewer outlet in that summer communities, bathing beaches and residences have become established along the shore of Lake Erie, making it undesirable and inadvisable to discharge untreated sewage into the lake at this location; and, further,

WHEREAS, Since the adoption of said intercepting sewer plan seventeen years ago, the art of purifying and disposing of the sewage has advanced and become greatly simplified, making the purification of sewage a practical problem, and,

WHEREAS, Should the sewage of the city of Cleveland be purified, it is deemed advisable in regard to efficiency, expediency and expense, to divide the city into three sections, an easterly, southerly and westerly one, for the purpose of collecting and disposing of sewage; now, therefore, be it

Resolved, That the application made to the Ohio State Board of Health by the director of public service of the city of Cleveland on June 12th, 1912, for approval of the proposed revised plan for the completion of the intercepting sewer system, and for the installation of sewage disposal plants in the three sections herein mentioned, be and is hereby endorsed, and that the said State Board of Health be respectfully requested to grant such permission; and be it further

Resolved, That the city clerk send to the State Board of Health a certified copy of this resolution to its meeting to be held in Toledo on June 19, 1912.

WHEREAS, The board of health of the city of Cleveland adopted a resolution on the tenth day of June, 1912, by which the State Board of Health of the State of Ohio, was requested to investigate the condition of the Cuyahoga River, which it was claimed had been corrupted by the discharge of sewage and other wastes into the same within the vicinity of Cleveland, and in which resolution said State Board of Health was requested to take action under the power given by the Ohio statutes, requiring the city to purify the sewage now flowing into the Cuyahoga River; and further,

WHEREAS, The city of Cleveland has engaged the services of sanitary experts in order to investigate and report on adequate means to properly purify the sewage of the city of Cleveland, including that now discharging into the Cuyahoga River; now, therefore be it

Resolved, That it is the sense of this council that the action of the city board of health in adopting said resolution on June 10, 1912, was warranted and proper, and that in case the State Board of Health of the state of Ohio should decide to order the city of Cleveland to take the necessary steps to purify the sewage now discharging into the Cuyahoga River, that this council will make no opposition to such action, and is prepared and willing to take such legislative steps as may be needed to comply with such order; and be it further

Resolved, That the director of public service be and he is hereby directed to present a copy of this resolution to the said State Board of Health at its meeting to be held in Toledo on June 19, 1912.

Mr. W. J. Springborn, Mr. Robert Hoffmann, city engineer, Mr. R. Winthrop Pratt, consulting engineer, and Mr. John N. Stockwell, assistant city solicitor, spoke in regard to the condition of the Cuyahoga River and the plans proposed for the betterment of the river; and upon sewerage conditions in Cleveland.

Mr. Hill, Dr. Warner and Dr. Miller discussed these matters with the delegation from Cleveland.

Mr. F. W. Green of Newburgh Heights was present and requested that the Board give thorough consideration to the project of locating the sewage purification plant in the valley of the Cuyahoga River, the location selected being in his neighborhood.

Mr. Springborn and Mr. Stockwell urged early action on the part of the Board on account of the necessity of legislation which would have to be adopted before the adjournment of council for its summer vacation.

Mr. Albert F. Matlack, representing the Hopcroft-Matlack process of sewage and garbage disposal, was present and requested that the Public Service Finance Corporation of Chicago be permitted to construct a plant at Akron.

Mr. George Champe, of Toledo, consulting engineer for the village of Swanton, was present and asked that the Board take immediate action on the plans for the water supply for Swanton. He was informed that owing to the fact that the plans had not been submitted in time for investigation, the matter would have to lie over until the next regular meeting of the Board.

The Board then went into Executive Session.

Dr. Miller moved that the sewerage proposition submitted by representatives from Cleveland be taken up at an adjourned meeting of the Board, to be held at the Hollenden Hotel, Cleveland, at 8 P. M., June 29th, 1912.

This motion was seconded by Mr. Hill and carried.

On motion of Dr. Grube, seconded by Mr. Hartzell, the minutes of the May meeting were approved

Those voting in the affirmative were Messrs. Warner, Hasencamp, Grube, Hill, Hartzell and Miller.

In the negative, none.

On motion of Dr. Hasencamp, seconded by Mr. Hartzell, the monthly report of the Secretary was approved.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Miller.

In the negative, none.

On motion of Dr. Grube, seconded by Mr. Hartzell, the report of the Finance Committee was approved, this report being a statement of the expenditures from May 1st to and including June 15th, and balances on June 15th, 1912.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Miller.

In the negative, none.

The Assistant Secretary presented a list of health officers, who had been appointed by council to serve in lieu of a board of health.

On motion of Mr. Hartzell, seconded by Mr. Miller, these health officers were approved.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Miller.

In the negative, none.

The Assistant Secretary presented a communication from the board of health of Cleveland, under date of June 14th, requesting that the Board no longer issue licenses for conducting maternity boarding houses in the city of Cleveland.

On motion of Dr. Grube, seconded by Dr. Hasencamp, this matter was referred to Dr. Miller as a special committee.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Miller.

In the negative, none.

On motion of Dr. Grube, seconded by Dr. Hasencamp, it was voted to renew the license to Mrs. Ella Hastings, 928 Miller Avenue, Columbus, permitting her to keep six children.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Miller.

In the negative, none.

On motion of Dr. Grube, seconded by Dr. Hasencamp, it was voted to renew the license to the Florence Crittenden Home, 1166 East Main Street, Columbus, permitting the keeping of six women and twelve children.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Miller.

In the negative, none.

At the request of Dr. Warner, Dr. Grube presented the following report of the Executive Committee:

"Your Executive Committee begs to submit the following recommendations:

1. That Dr. E. F. McCampbell be paid \$35.00 for consultation in regard to the State Board of Health laboratories, as per bill of March 30th, 1912.

2. That the following purchases be made:

For equipment of laboratory—

(a)	1 Barber isolating apparatus.....	\$15 00	
(b)	1 Bd. of H. head for centrifuge.....	\$11 50	
	5 doz. tubes 2 c.c. capacity.....	3 50	
	5 doz. rubber stoppers for 2 c.c. tubes.....	1 20	
			16 20
(c)	1 small incubator, 37° C.....	\$60 to	65 00
(d)	1 Wagner water still, capacity 2 gallons per hour.....		60 00
(e)	Carboy rocker with air vent.....		4 00
(f)	General supplies for laboratory (for 1912-1913 imported).....		425 00
(g)	2 copies, revised edition, Standard Methods of Water and Sewage Analyses		2 50
(h)	1 microscope and microphotographic apparatus.....		332 50

Respectfully submitted,

(Signed) FRANK WARNER, *Chairman*,
JOHN W. HILL,
Committee.

On motion of Mr. Hill, seconded by Dr. Grube, this report was adopted.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Miller.

In the negative, none.

Mr. Hill then presented his report, as Engineering Committee, and the matters were taken up in the following order:

The plan for sanitary sewers for New London, submitted by The W. J. Sherman Company, consulting engineers, on June 10th, 1912, was considered.

It was moved by Dr. Miller and seconded by Dr. Grube to withhold approval of this plan and to notify the authorities of New London, and their consulting engineers, that while the plan for sanitary sewers is in general satisfactory the Board will require that plans for a sewage purification plant, satisfactory to the State Board of Health, be submitted before approval of the sewers is given.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Miller.

In the negative, none.

The question of permitting the Pennsylvania Railroad Company, at its roundhouse, to use the effluent from the sewage purification plant at Mansfield, was considered.

It was moved by Dr. Miller and seconded by Mr. Hartzell that the Board declare the unfitness of the sewage effluent for water supply purposes and the danger of infection of the employes of the railroad company and others, resulting from its use, and that the secretary be instructed to notify the city of Mansfield to cease furnishing the effluent from its sewage purification plant to the railroad company for any use.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Miller.

In the negative, none.

The proposed improvement of the water softening plant at Oberlin, as shown on plans and specifications submitted by Mr. A. Elliott Kimberly, consulting engineer, on June 11th, 1912, was taken up for consideration.

It was moved by Dr. Hasencamp, and seconded by Dr. Grube, to approve these plans and specifications, subject to the following conditions:

1st. That in case the wood fiber filters fail to produce satisfactory filtration, filters of other material be substituted;

2nd. That the reaction channels be lengthened unless the operation of the improved plant demonstrates their adequacy; and,

3rd. That this approval be void unless the proposed improvements shall have been made prior to July 1st, 1913.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Miller.

In the negative, none.

It was moved by Mr. Hartzell and seconded by Dr. Miller that the sand for the sewage purification plant at Salem, to be obtained from the bank of The Standard Sand and Concrete Company, nine miles east of the city near the Pennsylvania Railroad, be approved subject to the following conditions:

1st. That only the material at a depth of six feet or more from the surface be used; and,

2nd. That the sand be so screened before placing as to insure an effective size of not less than 0.3 mm and a uniformity coefficient of not more than 2.2.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Miller.

In the negative, none.

The Secretary was instructed to advise the Salem authorities to instruct their inspecting engineer to examine all shipments of sand from the bank in order that no loamy material be included.

It was moved by Dr. Grube and seconded Mr. Hartzell to disapprove the proposed additional water supply for Sycamore, to be obtained from

the so-called Stalter Spring, as outlined in a request received from Mr. O. J. Niebel, secretary to the board of trustees of public affairs, on May 31st, 1912; and to advise the authorities of Sycamore to employ a competent consulting engineer to investigate the feasibility of increasing the present supply by the installation of additional wells, and of improving the quality of the supply by installing a process for the removal of the iron and hydrogen sulphide.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Miller.

In the negative, none.

The report upon the existing sewerage and proposed improvements at Chicago Junction was taken up for consideration.

It was moved by Dr. Hasencamp and seconded by Mr. Hartzell that the attention of the authorities be called to the fact that the construction of sewers in various portions of the village has not been carried out in accordance with plans approved by the State Board of Health in 1905, and that this construction has been done in violation of Section 1240 of the General Code; and also that the plan of Mr. John Laylin, engineer for the village, submitted May 31st, 1912, providing for the collection of sewage at present discharged into the B. & O. Railroad reservoir, at one point of outlet, be approved subject to the following conditions:

1st. That the village submit to the State Board of Health comprehensive plans for future installation of sewers and purification of the dry weather flow from all existing and future sewers; and,

2nd. That this approval be void unless the said plans shall have been submitted prior to September 1st, 1912, and purification works installed prior to September 1st, 1913.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Miller.

In the negative, none.

The question of additional sewerage for the easterly portion of Lakeside, to be connected with the existing sewers by pumping facilities, as outlined in a communication received from Mr. Otto H. Magly, secretary and superintendent of the Lakeside Campmeeting Association, June 6th, 1912, was taken up for consideration.

It was moved by Mr. Hartzell and seconded by Dr. Grube that this additional sewerage be approved subject to the following conditions:

1st. That plans for the purification of the sewage from Lakeside be submitted to the State Board of Health for approval not later than September, 1912, and that a purification plant be installed prior to June 1st, 1913;

2nd. That during the present season the sewage be disinfected with hypochlorite of lime in a manner satisfactory to the State Board of Health, before its discharge into the lake; and,

3rd. That the proposed sewers be built according to an established grade, and provided with manholes at changes of grade and direction, and flushing facilities.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Miller.

In the negative, none.

The Secretary was instructed to advise the Lakeside Campmeeting Association that sewers to be constructed in the future should be designed by a competent engineer to secure good grades, ventilation, and means of flushing.

The proposed improvement and enlargement of the water purification plant at Sandusky, according to plans and specifications submitted by Mr. Robert L. J. Wagar, city engineer, June 3rd, 1912, were taken up for consideration.

It was moved by Dr. Hasencamp and seconded by Dr. Grube that these plans be approved subject to the following conditions:

1st. That samples of filtering material and specifications therefor be submitted to and receive the approval of the engineer of the State Board of Health before being placed;

2nd. That detailed plans of rate controllers and loss of head gages for the proposed new filters be submitted to the State Board of Health for approval, and that the existing unsatisfactory rate controllers be replaced with efficient apparatus;

3rd. That the existing filters be overhauled and placed in perfect working condition;

4th. That provision be made whereby filtered water will be furnished to the consumers at all times during reconstruction, and to this end the use of a Smith sleeve and valve is suggested; and that plans and a statement of the method of carrying out this provision be submitted to and approved by the engineer of the State Board of Health before contracts for the installation are awarded;

5th. That the improvement and enlargement be made under the immediate supervision of an inspector experienced in the construction of water purification plants, representing the city; and,

6th. That there be submitted to the State Board of Health prior to October 1st, 1912, a design and estimate of cost for extension of the water works intake to a suitable location in Lake Erie.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Miller.

In the negative, none.

The Secretary was instructed to call the attention of the authorities to the facts that while the proposed improvement and enlargement of the water purification plant will greatly increase its efficiency and provide for its constant operation, the necessity of extending the water works intake to a point from which a mildly polluted water will be ob-

tained should not be overlooked; and that this improvement will be necessary if Sandusky Bay is to be continued in use as a receptacle for the sewage of the city.

It was moved by Dr. Grube and seconded by Dr. Hasencamp to approve the proposed water supply for New Berlin, to be obtained from drilled wells at least 75 feet in depth, and located on the site approved by the State Board of Health on March 21st, 1912, upon the following conditions:

1st. That an iron removal plant be installed by the village if future examinations by the State Board of Health demonstrate its necessity;

2nd. That complete detailed plans showing the method of developing the supply be submitted to and receive the approval of the State Board of Health; and,

3rd. That this approval be void unless the proposed supply shall have been installed prior to January 1st, 1914.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Miller.

In the negative, none.

It was moved by Dr. Miller and seconded by Dr. Grube that the plans and specifications for the proposed development of the water supply proposed for New Berlin, submitted by Messrs. John H. and O. W. Holl, engineers for the village, June 15th, 1912, in compliance with the second condition of the Board's approval, be approved, and that the attention of the authorities be called to the desirability of installing the pumping machinery in duplicate, and also of the advisability of recognizing the possible necessity of installing facilities for double pumping in case the water level in the wells should become lowered.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Miller.

In the negative, none.

The proposal additional water supply for Lisbon, to be obtained from drilled wells located on the "Fair Grounds" property, so-called, described in a request from the board of trustees of public affairs, May 20th, 1912, was taken up for consideration.

It was moved by Mr. Hartzell and seconded by Dr. Hasencamp that this proposed additional supply be approved temporarily, subject to the following conditions:

1st. That before January 1st, 1913, the village present to the State Board of Health for approval a plan for obtaining a permanently satisfactory water supply, the same to be formulated by a competent consulting engineer;

2nd. That the council pass an ordinance providing that all privy vaults, cesspools, and dug wells within a radius of 500 feet of any public supply well be removed or cemented and made watertight, and preventing the future establishment of such sources of pollution within that dis-

tance; said ordinance to be approved by the Secretary of the State Board of Health before its passage; and,

3rd. That this approval be considered void unless the proposed additional supply shall have been installed prior to January 1st, 1913.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Miller.

In the negative, none.

The Secretary was instructed to call the attention of the authorities to the fact that the length of air mains from the pumping station to the wells is excessive and will render pumping costly.

The Board then took up for consideration a communication from Mr. John M. Williams, director of public service at Portsmouth, under date of May 27th, 1912, asking the Board to approve plans for a new water supply for that city, submitted by Messrs. Witmer & Brown, consulting engineers, May 20th, 1912.

It was moved by Dr. Hasencamp and seconded by Mr. Hartzell to approve those portions of the plans showing details of the intake, pumping station, and distributing reservoir, provided that the new supply be installed and placed in operation before January 1st, 1914.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Miller.

In the negative, none.

It was moved by Dr. Hasencamp and seconded by Mr. Hartzell that the Board withhold approval of the plans and specifications for the purification plant, including the subsidence basin, coagulating basins, filters and accessories, and require that complete detailed drawings and definite specifications for this portion of the installation be submitted; and that the authorities be advised that in the preparation of revised plans and specifications for the purification plant, the following features be changed:

1. The capacity of the subsidence basin should be considerably increased;
2. The capacity of the coagulating basins should be increased to at least three hours.
3. The clear wells should be built as an independent structure separated from the other portions of the plant, or should be protected against leakage from the coagulating basins by a double or hollow wall.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Miller.

In the negative, none.

It was moved by Dr. Grube and seconded by Dr. Miller to approve the proposed water supply for Navarre, to be obtained from driven wells cased to a depth of 70 feet or more, located on land lying between the Tuscarawas River and the Ohio Canal 500 to 700 feet north of the West Lebanon Road, subject to the following conditions:

1st. That detailed plans showing the method of developing the supply and furnishing it for use be submitted to and receive the approval of the State Board of Health;

2nd. That the village council pass an ordinance preventing the future establishment of any leaching privy vault, cesspool, or other source of pollution within 500 feet of any of the supply wells; said ordinance to be approved by the Secretary of the State Board of Health before its passage; and,

3rd. That this approval shall be void unless the proposed supply shall have been installed prior to January 1st, 1914.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Miller.

In the negative, none.

Mr. Hill offered the following resolution:

WHEREAS, In the past much of the time of the Board at board meetings has been taken up in listening to proposals for public improvements not previously submitted to the executive officer of the Board, and without previous examination by the officers of the Board, thereby resulting in loss of time to the Board and to local communities and also in not providing proper records for the Board and its officials, therefore

Be it resolved, That no proposals for such public improvements as come under the supervision of the State Board of Health will be entertained unless the application for the improvement and such information as is required shall first have been submitted to the Secretary of this Board.

It was moved by Dr. Hasencamp and seconded by Dr. Grube that this resolution be adopted.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Miller.

In the negative, none.

Mr. Hill then offered the following resolution:

WHEREAS, From the investigation of wastes disposal conducted by this Board during 1909 and 1910 it is shown that further investigation of this subject is desirable and necessary; and,

WHEREAS, It is the belief of this Board that the scope of the work should be extended so as to include the methods and practices of waste disposal throughout the United States and elsewhere, therefore

Be it resolved, That the federal government through the Department of Agriculture, or other appropriate department or bureau, be requested to make an investigation of wastes disposal, and that the Secretary of the Board be instructed to transmit a copy of this resolution and a copy of the special report of the Board on this subject to the Secretary of the United States Department of Agriculture.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Miller.

In the negative, none.

The Board then took up the complaint of the board of health of the city of Cleveland, that the city of Cleveland is discharging and permitting to be discharged sewage and other wastes into the Cuyahoga River, and by reason thereof has so corrupted said Cuyahoga River as to give rise to foul and noxious odors, thereby creating conditions that are detrimental to the health and comfort of the citizens of Cleveland who reside in the vicinity of said river.

Dr. Miller presented a report of the committee appointed to investigate this complaint. The report was read.

It was moved by Dr. Grube and seconded by Dr. Miller that the Board does find from the report of its committee and other evidence that the Cuyahoga River is grossly polluted along its course through the city of Cleveland, giving rise to foul and noxious odors, thereby creating conditions that are detrimental to the health and comfort of the citizens of Cleveland who reside in the vicinity of said river.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Miller.

In the negative, none.

Thereupon, it was moved by Dr. Grube and seconded by Dr. Miller that the Secretary be instructed to notify the authorities of Cleveland of the Board's findings, and that the Board has fixed 8 P. M., Thursday, the eighteenth day of July, 1912, at the Hollenden Hotel, Cleveland, as the time and place, when and where the city of Cleveland, by its officers or others, may have an opportunity to be heard and to show cause why the said city should not be required to abate this nuisance.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Miller.

In the negative, none.

The Assistant Secretary presented the following letter from the Department of Public Service of Dayton:

"DAYTON, OHIO, June 18th, 1912.

State Board of Health, Columbus, Ohio.

GENTLEMEN:—In answer to your letter of May 13th ult., will say that no steps have been taken other than the approval of the Benzenberg plan, which fact has already been brought to your notice, and the passage of a bond ordinance by council of \$120,000.00 for this improvement, which money will be available on or about July 1st.

Active steps will then be taken to carry out the Benzenberg plan, which system has been approved by your Board and accepted by the city of Dayton.

Truly yours,

DEPARTMENT OF PUBLIC SERVICE,

By order of the Director.

By C. J. GROSS, *Secretary.*"

On motion of Mr. Hill, seconded by Dr. Miller, the Secretary was instructed to send to the director of public service of Dayton, a copy

of the action of the Board taken at its meeting on May 9th, 1912, and to notify the director of public service that the city authorities of Dayton would be expected to furnish a statement as to what steps have been taken in the proposed improvement and enlargement of the public water supply, accompanied by such data as may have been secured, in time for presentation at its meeting to be held July 18th, 1912; and to state that the above letter does in no wise furnish the information requested.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Miller.

In the negative, none.

The Assistant Secretary presented correspondence relative to the appointment of Dr. Frank C. Smith as health officer of the village of Geneva, to serve in lieu of a board of health. (Protested.)

Upon motion of Mr. Hill, seconded by Dr. Hasencamp, this matter was referred to Dr. Sutton and Dr. Miller as a special committee.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Miller.

In the negative, none.

The Assistant Secretary presented a petition from the board of health of Cincinnati, under date of May 15th, 1912, asking the Board to investigate a public nuisance caused by the pollution of Mill Creek because of the discharge of crude sewage and manufacturing wastes by certain cities, villages, corporations and persons into said creek.

It was moved by Mr. Hill and seconded by Dr. Miller that the Secretary be instructed to notify the board of health of Cincinnati that this Board had been informed that the city of Cincinnati has in contemplation certain improvements that will relieve the conditions of which complaint is made, and that the Board did not desire to take any steps in this matter that would in any way interfere with the progress of certain improvements; and also that the Secretary write the authorities of Cincinnati for information relative to the steps now being taken to improve Mill Creek, and to present this information at the next regular meeting of the Board.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Miller.

In the negative, none.

Mr. Hill presented a letter, under the date of June 12th, 1912, from Mr. C. D. Crouch, of Chicago, president of The Public Service Finance Corporation, relative to the proposition for sewage and garbage disposal for Akron.

Mr. Hill moved that it be the sense of the Board that the report of Mr. F. C. Williams on the plans for sewage and garbage disposal for Akron is not a compliance with the action of the State Board of Health requiring the city of Akron to furnish the Board with a comprehensive report on the Hopcroft-Matlack process of sewage and garbage disposal,

and that the Secretary be instructed to so notify the director of public service of Akron.

This motion was seconded by Dr. Miller and carried, those voting in the affirmative being Dr. Warner, Dr. Hasencamp, Mr. Hartzell, Dr. Grube, Mr. Hill and Dr. Miller.

In the negative, none.

The Assistant Secretary reported on the results of the notice sent to the authorities of Newark and Hamilton, regarding the organization of a board of health in these cities. He stated that the council of Newark had provided for a board of health and appointments had been made by the mayor; and that the council of Hamilton would pass the legislation as soon as possible for the creation of such a board.

The Assistant Secretary presented a petition from the trustees of Washington Township, Lucas County, citing a resolution adopted by them on June 19th, 1912, alleging that the board of county commissioners of Lucas County are polluting Sibley Creek by the discharge of sewage and other wastes into said creek.

On motion of Dr. Grube, seconded by Dr. Miller, this matter was referred to a committee consisting of Dr. Hasencamp and the chief engineer for investigation and report.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Miller.

In the negative, none.

The Assistant Secretary presented the annual report of the Board for 1911, which, on motion of Mr. Hill, seconded by Dr. Grube, was ordered filed with the Governor.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Miller.

In the negative, none.

On motion of Dr. Grube, seconded by Dr. Hasencamp, the President was authorized to appoint a Committee on Program for the October conference with boards of health of Southern Ohio.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Miller.

In the negative, none.

Dr. Grube brought up the question of revision of the by-laws, and moved that a committee be appointed to make this revision.

This motion was seconded by Mr. Hill and carried, those voting in the affirmative being Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Miller.

In the negative, none.

The President then appointed Dr. Grube and the Secretary as this committee.

The election of officers for the ensuing year was then taken up, and on motion of Mr. Hill, seconded by Dr. Grube, Dr. Oscar Hasencamp was nominated for president.

On motion, the nomination was then closed. All members present voted in the affirmative, and Dr. Hasencamp was declared elected president, to take his seat at the October meeting.

On motion of Dr. Grube, seconded by Mr. Hill, Mr. Josiah Hartzell was nominated for vice-president.

On motion, the nomination was closed. All members present voted in the affirmative and Mr. Hartzell was declared elected vice-president.

Dr. Grube then spoke of the death of Mrs. Hill on May 13th, and moved that the Board extend to Mr. Hill and the members of his family, its sincere sympathy in their bereavement.

This motion was seconded by Dr. Miller and was adopted by a rising vote.

Mr. Hill then moved that the Board adjourn to meet at the Hollenden Hotel, Cleveland, June 29th, 1912.

This motion was seconded and carried.

Attest:

JAMES E. BAUMAN,
Assistant Secretary.

Approved July 18th, 1912.

SPECIAL MEETING

6-28-1912

A special meeting of the State Board of Health was held at the Hollenden Hotel, Cleveland, June 28th, 1912, at 8 P. M. (The date as fixed by adjournment of preceding meeting was changed by order of the President. Secretary.)

There were present Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Miller.

The Secretary presented requests from the director of public service of Mansfield and Mr. W. F. Beardsley, master mechanic of the Pennsylvania Railroad Company, asking the Board to modify its order relative to the use of the effluent of the sewage purification plant at Mansfield.

It was moved by Mr. Hill and seconded by Dr. Miller to permit the use of this effluent for boiler and boiler washing purposes, provided:

1. That the railroad company immediately install for drinking and washing purposes the city public water supply, or other water supply of suitable quality;

2. That the railroad company make known, by suitable notice, the fact that the water received from the sewage purification plant is *impure and dangerous to health*; such notice to be posted wherever said water is available; and,

3. That should the efforts of the railroad company result in failure to secure a sufficient amount of water for all purposes from additional wells, the railroad company will install some method of sterilization of the sewage effluent, the plans for such sterilization plant to be submitted to and approved by the State Board of Health.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Miller.

In the negative, none.

The Secretary was instructed to call the attention of the city officials to the necessity of supplementing the present supply, and to suggest that as soon as possible a competent engineer be employed to study the water supply question.

The Board then took up for consideration the matter of improvement in sewerage conditions at Cleveland.

It was moved by Dr. Miller that the Board approve the location for a sewage purification plant south of the city and to the east of the

Cuyahoga River, with the understanding that the method of sewage disposal to be adopted and installed at this location shall represent the most advanced state of the art of sewage purification and shall be in all respects satisfactory to the State Board of Health before plans will be approved; and that the question of locations for sewage disposal works at the easterly and westerly points, as proposed by the city officials, be held in abeyance for further consideration by the Board.

This motion was seconded by Mr. Hill. The President asked for remarks by the city officials or citizens. There being no response the motion was put and carried.

Those voting in the affirmative were Messrs. Warner, Hazencamp, Hartzell, Grube, Hill and Miller.

In the negative, none.

Mr. F. W. Green, solicitor for the village of Newburgh Heights, then called the attention of the Board to conditions already existing in that village due to the location of the Cleveland garbage reduction plant, and stated that the residents of the village objected to the location of other plants that would make residence in the village any less desirable. He made special request that the Board give careful consideration to the detail plans for construction before the city be permitted to proceed.

Mr. W. E. Loesh, mayor of Newburgh Heights, spoke against the location of purification works within the village and suggested other possible locations.

In reply, Mr. Hill stated that the Board would require the city to install a plant in which would be embodied the most advanced knowledge of sewage purification.

Mr. Robert Hoffman, city engineer, stated that a careful study of locations had been made before deciding on the one selected and that the site referred to by Mr. Loesh was not adapted to the purpose because not large enough.

In answer to the request that the Board delay action, Mr. W. J. Springborn, director of public service, stated that it was necessary to advise council as to how appropriations were to be expended, and in order to prepare a statement before council adjourned for vacation, it was necessary to have the action of the Board. He further stated that some of the options expire during July and that it was necessary for council to authorize purchase if the site was to be secured.

Messrs. Fitzgerald and Woods, members of the Cleveland city council, notified the Board that they expected to present at the July meeting a petition asking the Board to require the city of Cleveland to purify its public water supply.

It was moved by Dr. Miller and seconded by Dr. Grube that the Board adjourn. Carried.

Attest:

E. F. McCAMPBELL,
Secretary.

Approved July 18th, 1912.

JULY MEETING

1912

A regular meeting of the State Board of Health was held at the Hollenden Hotel, Cleveland, Thursday evening, July 18th, 1912, at 8 P. M.

There were present Messrs. Warner, Hasencamp, Hartzell, Grube, Hill, Sutton and Miller.

On motion of Mr. Hill, seconded by Mr. Hartzell, the minutes of the June 19th, 1912 meeting were approved.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill, Sutton and Miller.

In the negative, none.

On motion of Mr. Hill, seconded by Dr. Grube, the minutes of the adjourned meeting, June 28th, 1912, were approved.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill, Sutton and Miller.

In the negative, none.

On motion of Dr. Hasencamp, seconded by Dr. Miller, the monthly report of the Secretary was approved.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill, Sutton and Miller.

In the negative, none.

On motion of Mr. Hill, seconded by Dr. Grube, the report of the Finance Committee was approved, this report being a statement of the expenditures from June 16th to and including July 15th, 1912, and balances on July 15th, 1912.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill, Sutton and Miller.

In the negative, none.

Mr. Charles H. Hoglen, director of public service, Mr. G. C. Cummins, city engineer, and Mr. Charles Kline, special engineer, of Dayton, appeared before the Board in response to a request for information concerning the development of the water supply of Dayton.

Mr. Hoglen presented a communication under date of July 18th 1912, signed by himself as director of public service, giving a history of the recent development of the water supply.

Remarks were then made by Mr. Hill upon the present condition of the water supply of Dayton; and on motion of Mr. Hill, seconded by

Dr. Grube, it was voted to approve the proposed water supply to be derived from wells in the valley of Mad River as respects the quality only; the city to assume all responsibility as to the quantity that can be secured, and that the conditions in the Board's approval of February 19th, 1912, be reaffirmed, namely: "That the city authorities permanently control, by purchase or otherwise, all territory within 1000 feet of any of the proposed wells, and cause to be removed, and prevent the future establishment of, sources of contamination within this distance; and that a certified copy of an ordinance by the city council providing for such purchase or control be filed with the Secretary of the State Board of Health before any of the proposed wells are placed in use, said ordinance to be approved by the State Board of Health before its passage."

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill, Sutton and Miller.

In the negative, none.

A delegation from Ironton, consisting of Mr. F. W. Ehrlich, president of council; Mr. A. J. Layne, solicitor; Mr. D. J. James, councilman; Mr. F. A. Ross, clerk of the department of service; and Mr. Clyde K. Turley, clerk pro tem. of council, was present in response to a citation to appear before the Board with information as to what the city is doing to comply with the Board's requirements for the improvement of the public water supply.

On motion of Mr. Hill, seconded by Dr. Grube, the delegation was limited to two speakers.

Mr. F. A. Ross then read a statement in regard to the development of a water supply to the effect that differences in plans and specifications, delay of contractors to furnish material, and the high stage of the river had made it impossible to install the test unit.

Mr. Hill stated that since the order of the Board sufficient time had elapsed to enable the city to construct an efficient plant and in the meantime Ironton was having a high typhoid fever death rate, due to the use of a polluted water.

Mr. D. J. James stated that it is the desire of the present city officials to improve the public water supply as soon as possible, and that it had not been their intention to ignore the orders of the Board. He stated that the present mayor and director of public service are in sympathy with the improvement and will make tests as soon as the river reaches such stage as to make the work possible.

The matter was discussed by Dr. Warner and Mr. Hill with members of the delegation, and then referred to executive session.

The following representatives from Cleveland were present in response to a citation to appear for a hearing on the complaint that the sewage of the city was polluting the Cuyahoga River to the extent of causing a public nuisance; Mr. N. D. Baker, mayor; Mr. W. J. Spring-

born, director of public service; Mr. John N. Stockwell, assistant city solicitor; Mr. Robert Hoffmann, city engineer; and Mr. R. Winthrop Pratt, consulting engineer.

Mr. J. J. Smith, ex-member of the board of health of Cleveland, protested against the location and construction of the sewage disposal plant south of the city; and suggested that the plans of a former engineering commission be followed.

Mr. N. D. Baker, mayor, stated that the city of Cleveland was anxious to remedy conditions now existing in the Cuyahoga River and that the city would not protest against an order of the State Board of Health requiring purification of the sewage now being discharged into the river.

Mr. W. S. Fitzgerald, member of the city council, protested against the issuing of an order requiring sewage purification, and requested that action be deferred until such time as the city would also provide for the purification of the water supply.

Mr. F. W. Green, solicitor of Newburgh Heights, and the Rev. F. A. Houser, pastor of a church at Newburgh Heights, protested against the location of the sewage disposal works within the village.

The matter was referred to executive session.

Mr. Frank W. Rockwell, mayor of Akron; Mr. C. D. Crouch, president of the Public Service Finance Corporation, of Chicago; Mr. C. C. Benner of Akron, attorney for said corporation; and Mr. A. F. Matlack, representing the inventors, appeared before the Board and asked approval for the installation of the Hopcroft-Matlack process for disposing of the sewage and garbage of the city of Akron.

The matter was referred to executive session.

Mr. L. B. Houck and Mr. R. S. Blinn, city engineer, of Mt. Vernon, appeared before the Board and requested permission to construct additional sewers with outlets into the Kokosing River and Center Run.

This matter was referred to executive session.

Representatives of The Mahoning Valley Water Company were called for but were not present. The Secretary was instructed to notify the company that plans for the purification of that part of the water supply furnished to Struthers and East Youngstown used for domestic purposes must be presented to the Board at its next meeting.

The Secretary read a communication from the clerk of council of Zanesville, transmitting a copy of a resolution adopted by council under date of July 15th, 1912, relative to plans for the improvement of the public water supply of that city and stating that owing to the necessity of waiting sixty days after adoption of the resolution authorizing the department of public service to enter into a contract with an engineer it was impossible to have plans submitted at the July meeting, as required by the Board. The resolution further stated that on July 13th the director entered into a contract with the firm of Hering and Gregory

of New York, and additional time was requested in which to present plans to the Board.

Mr. Hill moved that the city of Zanesville be given an extension of thirty days time in which to come before the Board with a definite statement as to whether the city would adopt a water supply to be derived from wells, or a supply taken from the river and filtered, and also general plans for the development of the supply; it being understood that the quality of the supply, if taken from wells should meet the approval of the State Board of Health, and if the city should decide to take water from wells on the Hague farm or elsewhere, that satisfactory tests should be made by the city to determine the proper yield of such wells and assure a sufficient supply of water to meet the present and reasonable future requirements of the city, before asking the Board for final approval of such source.

This motion was seconded by Dr. Miller. Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill, Sutton and Miller.

In the negative, none.

The Board then went into executive session.

Upon the suggestion of Dr. Grube, the Secretary was instructed to refer to the Attorney General for an opinion the question of whether or not the referendum will apply to funds raised in compliance with an order of the State Board of Health issued under authority of the Bense Act.

The Secretary presented communications relative to the position and qualifications of several applicants for the position of bacteriologist and stated what he thought to be the essential points to be considered in connection with the position. The matter was thoroughly discussed by all members of the Board, especially regarding requirements as to services and the permanency of the position to a person properly qualified.

On motion of Mr. Hill, seconded by Dr. Miller, it was voted to refer the applications to a committee consisting of Drs. Warner, Grube and the Secretary, for further inquiry, with instructions to report at the next meeting of the Board.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill, Sutton and Miller.

In the negative, none.

Mr. Hill presented the following report of the Executive Committee:

"The Executive Committee begs to submit the following recommendations:

1. That the salary of C. K. Weiman, laboratory helper, be increased \$5.00 per month.

2. That the salary of Calvin Robinson be increased \$5.00 per month.

(There still remains unexpended, of the appropriation for laboratory helpers, the sum of \$10.00 a month, and it seems advisable to make the above increase

as these men have been in the employ of the Board for some time and have rendered efficient service.)

3. That the following purchase be made for the laboratories:

2 110 v. d. c. motors to replace our 110 v. a. c. motors, in exchange.

(The moving of the departments from the State House to the Hartman Building, where the electric current is of different character, necessitates change in the above mentioned motors. These motors are necessary in the operation of the centrifuge and shaker.)

4. That the following periodicals be subscribed to:

a. Journal of Experimental Medicine.....	\$5 00 per year
b. Annals de l'Institut Pasteur.....	4 50 per year
c. Centralb. fur Bak. u. Par.....	3 75 per year
d. Medical Officer	3 75 per year

5. That the following books be purchased:

a. Public Health Laboratory Work, Kenwood, 11 shillings.

b. Handbuch fur Pathogen Micro-organismum.

This work is regarded as the standard of all bacteriological texts.

A new edition is being prepared at a price of \$1.10 per part. It will, perhaps, be a year before the edition is complete, the total cost being, approximately, \$40.00, which includes about eight or ten volumes.

6. That the president of the Board appoint delegates to the following conferences:

a. Fourth International Congress on School Hygiene. Meeting in Buffalo, August 25th to 30th, 1912.

b. The American Association for the Study and Prevention of Infant Mortality. Cleveland, October 2nd to 5th, 1912.

c. The Fifteenth International Congress on Hygiene and Demography in Washington, D. C., September 23rd to 28th, 1912.

(The President, Vice-President and Secretary are delegates to the American Public Health Association, September 18th-20th; and the Conference of State and Provincial Boards of Health of North America, September 20th-21st, 1912; by action of the Board taken at the March 18th, 1911, meeting.)

7. That the Board authorize the purchase of screens for all necessary windows in offices and laboratories of the Board.

(The Secretary has taken the matter up with the manager of the building and finds that it is impossible to secure screens through the owners of the building, as it is not customary for the owners of office buildings in cities to supply them. This action would seem to be imperative inasmuch as the board of health stands as favoring all general matters of public health and sanitation, and especially in this connection, the elimination of the fly.)

8. That the Board pay the traveling expenses to Cleveland and Columbus of Dr. Brown, bacteriologist, who attends this meeting on invitation of the Executive Committee, with prospects of employment.

Respectfully submitted,

(Signed) FRANK WARNER, *Chairman*,
JOHN W. HILL."

On motion of Mr. Hill, seconded by Dr. Grube, this report was approved.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill, Sutton and Miller.

In the negative, none.

Mr. Hill then presented his report as Engineering Committee, and the matters were taken up in the following order:

It was moved by Dr. Miller and seconded by Dr. Grube, that the plans for proposed extension and improvement of the existing water works system at Swanton, submitted by Mr. George Champe of Toledo, consulting engineer, on July 3rd, 1912, be approved subject to the following conditions:

1st. That the village have a complete survey made of all available sources of water supply, both of ground and surface origin, with the intention of ultimately installing a supply of satisfactory quality and quantity; and,

2nd. That after the improved pumping facilities shall have been installed and before the other features of the water supply improvements shall have been made, a thorough pumping test of several days duration be conducted to obtain more reliable data regarding the yield of the present supply; and that said data be submitted to the State Board of Health.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill, Sutton and Miller.

In the negative, none.

The Secretary was instructed to call the attention of the village authorities and their consulting engineer to the possibility of increasing the well yield by means of deep well explosions to open the water vein.

It was moved by Dr. Miller and seconded by Dr. Grube, to withhold approval of Pine Lake as an additional water supply for Struthers and East Youngstown, as described in a request received from Mr. M. E. McCaskey, general manager of The Mahoning Valley Water Company, on May 4th, 1912, and to furnish the village officials and the water company the following information:

(1) An examination of the watershed of Pine Lake and the analytical results from samples collected, indicate little danger of sewage pollution of the proposed supply;

(2) Visual and analytical examinations of the water in the reservoir indicate that it is distinctly colored, rendered turbid, and impregnated with iron, due to the vegetable matter on the sides and bottom; and that this effect is increased by long-continued storage of the water in the reservoir.

(3) The present condition of the reservoir is favorable to the growth of algæ, which impart to the water marked tastes and odors.

(4) The characteristics of the water of Pine Lake are such as to require special treatment to remove the objectionable stain, odor, and iron especially as the iron is probably derived from a vegetable source.

(5) In order to accomplish an improvement in the character of the water in Pine Lake, it will be necessary to drain the lake and remove from the sides and bottom of the reservoir, all vegetable growths and organic matter; the magnitude of such an undertaking, however, is fully realized.

(6) That in the light of the foregoing statements, the Board does not feel justified in passing upon Pine Lake as an additional source of water supply for Struthers and East Youngstown until plans for the purification of the existing and proposed supplies, satisfactory to the State Board of Health, have been submitted, and until the Board shall have considered the possibility of the improvement of the water from Pine Lake brought about by passage to and storage in Hamilton Lake.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill, Sutton and Miller.

In the negative, none.

It was moved by Dr. Miller and seconded by Dr. Grube, that the proposed water supply for the community of Twinsburg, as shown on a general plan submitted by Mr. P. P. Evans, secretary of The Wilcoxon Water Company, on June 12th, 1912, and on detailed plans received from The Osborn Engineering Company on July 6, 1912, be approved subject to the following conditions:

1st. That a revised plan be submitted, showing the details of the spring box, particularly as regards the entrance of the water from the spring;

2nd. That two substantial fences be built around the spring, one immediately adjacent to it and one 300 feet or more distant; and,

3rd. That this approval be void unless the proposed supply shall have been installed prior to July 1st, 1913.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill, Sutton and Miller.

In the negative, none.

The Secretary was instructed to inform the water company and its engineers that the Board is of the opinion (1) that the proposed supply is of limited quantity; (2) that it may be possible to increase the yield of the spring by deepening and widening the spring box; and (3) that frequent flushing of the mains at the dead ends will be necessary to maintain the supply in good condition as delivered to the consumers, and facilities for such flushing should be provided.

It was moved by Dr. Miller and seconded by Dr. Grube, that the plan providing for the installation of a sludge filter at Alliance by utilizing the area of one of the intermittent filter units, submitted by Mr. E. G. Bradbury, consulting engineer, on July 13th, 1912, be approved subject to the following conditions:

1st. That the entire area (approximately 40,000 square feet) of the filter be utilized as a sludge filter either as one unit or divided into

two units; and that the entire contents of the sedimentation tanks be discharged upon this area; and,

2nd. That this approval shall be considered void unless the sludge filter shall have been installed prior to July 1st, 1913.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill, Sutton and Miller.

In the negative, none.

The Secretary was instructed to inform the authorities that their consulting engineer should be advised that in the opinion of the State Board of Health the use of the units, regularly employed as final intermittent filters, as areas to receive liquids from the sedimentation tanks incidental to cleaning, is objectionable and is likely to result in the rapid clogging of the filters; and that an entirely independent sludge filter, to receive both the sludge and supernatant liquids from the tanks, should be provided.

It was moved by Dr. Miller and seconded by Dr. Grube, that the request made by the consulting engineer, Mr. H. C. Innes, for an extension of the time in which to let contracts for the construction of the proposed system of sanitary sewers for Arlington Heights, be granted, and that the Board revise the third condition of its approval given April 11th, 1912, to read as follows:

3rd. That this approval be void unless contracts for the construction of the proposed sewers shall have been made prior to January 1st, 1913.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill, Sutton and Miller.

In the negative, none.

It was moved by Dr. Miller and seconded by Dr. Grube, to approve the revised plans for a proposed system of combined sewers for Bremen, submitted by Mr. E. R. Johnston, engineer for the village, July 13th, 1912, subject to the following conditions:

1st. That an asphaltic compound or equivalent, satisfactory to the engineer of the State Board of Health, be used to make the joints of all sewers watertight within a radius of 1000 feet from the water supply wells;

2nd. That automatic flush tanks be installed at the head of the Oak Street and Friesner Avenue sewers to prevent the standing of solid matter within the sewers;

3rd. That the village have prepared plans and profiles for an intercepting sewer to carry the dry weather flow of sewage from the existing and proposed outlets to a suitable location for sewage purification works, at least 2500 feet downstream from the proposed outlet; and that this interceptor be constructed when deemed necessary by the State Board of Health;

4th. That sewage purification works of a design satisfactory to the State Board of Health, be installed when deemed necessary by said Board; and,

5th. That this approval shall be considered void unless plans for an intercepting sewer shall have been submitted prior to January 1st, 1913.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill, Sutton and Miller.

In the negative, none.

The Secretary was instructed to say to the Bremen authorities that the State Board of Health does not generally approve of the installation of combined sewers, especially in cases where the purification of the sewage may be required immediately or ultimately; and that the cost and difficulty of operation of sewage purification works are increased when combined sewers are used.

It was moved by Dr. Miller and seconded by Dr. Grube to withhold approval of the plans for proposed sanitary sewers for Sewer District No. 3, Canal Dover, prepared by Mr. George E. Arnold, city engineer, and submitted by Mr. Charles H. Krantz, director of public service, on May 27th and July 8th, 1912; and that the Secretary advise the city officials that the plans for sanitary sewers for Sewer District No. 3 are in general satisfactory, but that plans for a sewage purification plant satisfactory to the State Board of Health must be submitted before approval of the sewers will be granted.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill, Sutton and Miller.

In the negative, none.

It was moved by Dr. Miller and seconded by Dr. Grube, to withhold approval of the plan for proposed additional sewerage for Mt. Vernon, submitted by Mr. Ray S. Blinn, city engineer, on July 5th, 1912, and to require revised plans for proposed additional sewerage for Mt. Vernon, embracing the following features:

(1) The provision of separate sewers for future extension of the system.

(2) The provision of a main sewer to carry the entire sewage flow to one point of outlet.

(3) The provision of a sewage purification plant satisfactory to the State Board of Health.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill, Sutton and Miller.

In the negative, none.

The Secretary was instructed to advise the city officials that the preparation of revised plans in accordance with the above provisions should be based upon a comprehensive study of the local conditions by a competent sanitary engineer,

It was moved by Dr. Miller and seconded by Dr. Grube, that the plans and specifications for a proposed sewerage system and sewage purification plant for the State Serum Institute, near Reynoldsburg, submitted by Mr. A. Elliott Kimberly, consulting engineer, on July 5th, 1912, be approved subject to the following conditions:

1st. That samples of the filtering material be submitted to and receive the approval of the engineer of the State Board of Health before being placed;

2nd. That the officials of the institute appoint a caretaker to attend to the operation of the sewage purification plant;

3rd. That the officials of the institute furnish to the State Board at monthly intervals the results of the studies and experiments regarding the disinfection of the sewage; and,

4th. That this approval be void unless the proposed sewage system and sewage purification plant shall have been constructed prior to August 1st, 1913.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill, Sutton and Miller.

In the negative, none.

It was moved by Dr. Miller and seconded by Dr. Grube, to adopt the report and recommendations of the special committee appointed to investigate the alleged pollution of Sibley Creek, the said recommendations being as follows:

(1) That an investigation of Sibley Creek shows the stream to be seriously polluted near its mouth by wastes from industrial establishments, and mildly polluted at its upper portion by sewage from West Toledo.

(2) That the county commissioners of Lucas County are not responsible for the condition of the stream, and that there is no cause for requiring them to abate the nuisance.

(3) That the abatement of the nuisance arising from the industrial establishments is clearly within the power of the township trustees.

(4) That conditions in the upper portion of Sibley Creek could be improved by the construction of a sanitary sewer by the county commissioners, to receive the sewage from West Toledo and carry it to a proper point of disposal.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill, Sutton and Miller.

In the negative, none.

It was moved by Dr. Miller and seconded by Dr. Grube, to disapprove the site for proposed public water supply wells for Magnolia, approval of which was requested in a communication received from Mr. W. L. Hime, mayor, July 16th, 1912; the said site being located north of Carrollton Street between Big Sandy Creek and the Sandy and Beaver Canal.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill, Sutton and Miller.

In the negative, none.

The Secretary was instructed to call the attention of the village officials to the necessity of securing a water supply safeguarded by its location, and sites in the valley of Big Sandy Creek above a point where the subsoil drainage of the village may pass should be investigated and if found satisfactory such a site should be selected and submitted to this Board for approval.

The question of sewage and garbage disposal for the city of Akron was taken up: The chief engineer presented the summary and recommendations of his report of an investigation of the plans submitted by Mr. Frank W. Rockwell, mayor, on July 8th, 1912.

It was moved by Mr. Hill and seconded by Dr. Miller to adopt the recommendations of the chief engineer, which were as follows:

That the Board disapprove the plans of the Public Service Finance Corporation, representing the Hopcroft-Matlack process of sewage and garbage disposal, approval of which as a proposed installation for Akron was requested by Mr. Frank W. Rockwell, mayor, in a communication received July 8th, 1912.

That the city officials and the Public Service Finance Corporation should be informed that the Board is of the opinion that the plans do not provide for the efficient purification of the liquid portion of the sewage, or a logical or practicable method of disposal of the sludge and garbage.

That the city officials be further informed that the Board is cognizant of the fact that experiments are being carried on by the city to determine the most suitable method of purifying the sewage of the city, and that the Board will require that these experimental studies be continued to their completion in order that a logical solution of the problem of the disposal of sewage at Akron may be secured.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill, Sutton and Miller.

In the negative, none.

On motion of Mr. Hill, the question of subscribing for the Municipal Bulletin of The Ohio News Bureau was referred to the Secretary with instructions to bring the matter before the Board at its next meeting.

Dr. Sutton presented the report of the special committee appointed to consider the appointment of Dr. Frank C. Smith as health officer of Geneva, to serve in lieu of a board of health, a protest having been made against this appointment. The committee recommended disapproval of the appointment of Dr. Smith.

On motion of Mr. Hill, seconded by Dr. Miller, it was voted to disapprove the appointment of Dr. Frank C. Smith as health officer of the village of Geneva.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill, Sutton and Miller.

In the negative, none.

Dr. Grube presented a report upon his inspection, May 27th, of a site proposed for the district tuberculosis hospital for the counties of Montgomery and Preble and moved that the Board approve this site, known as the Sullivan farm, a tract of 40 acres located north of the Eaton Pike.

This motion was seconded by Dr. Miller. Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill, Sutton and Miller.

In the negative, none.

The Board then took up the question of the pollution of the Cuyahoga River at Cleveland. An opportunity having been given the city of Cleveland, through and by its officers to be heard and no good cause having been urged why the city of Cleveland should not be required to abate the nuisance complained of, it was moved by Dr. Sutton and seconded by Dr. Grube that the report of the committee of the Board be now approved and confirmed.

The roll call upon the adoption of this motion resulted as follows: Yeas, Messrs. Warner, Hasencamp, Hartzell, Grube, Hill, Sutton and Miller. Nays, none.

It was thereupon moved by Dr. Miller and seconded by Mr. Hill that the conditions set forth in the report constitute a public nuisance and that it be declared necessary that the city of Cleveland be required, on or before July 1st, 1915, to cease the pollution of the Cuyahoga River and to install such works or means for purifying or otherwise disposing of its sewage or other wastes now being discharged into said river as will remove pollution from said river.

The roll call upon the adoption of this motion resulted as follows: Yeas, Messrs. Warner, Hasencamp, Hartzell, Grube, Hill, Sutton and Miller. Nays, none.

Thereupon it was moved by Dr. Hasencamp and seconded by Dr. Grube that the report and findings of this Board be transmitted to the Governor and the Attorney General for their action thereon.

The roll call upon the adoption of this motion resulted as follows: Yeas, Messrs. Warner, Hasencamp, Hartzell, Grube, Hill, Sutton and Miller. Nays, none.

The question of the water supply of Ironton was considered and it was decided to take no action at this time, the Secretary to notify the city authorities that they would be expected to install a test unit as soon as the stage of the river permits, and to notify the State Board of Health of the results of the test.

A communication from the director of public service of Youngstown was presented, requesting permission to advertise immediately for

bids on the construction of the improvements to be made to the water filtration plant at Youngstown.

It was moved by Mr. Hill and seconded by Dr. Sutton, that the director of public service be notified that the Board has no objection to his advertising for such bids at once, and that the plans for the improvements would be considered by the Board at its next meeting.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill, Sutton and Miller.

In the negative, none.

It was moved by Dr. Miller and seconded by Mr. Hill to renew the license to the Florence Crittenton Home, to conduct a maternity boarding house and lying-in hospital at 1161 McGuffey Street, Youngstown, giving permission to keep ten women or ten children at one time.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill, Sutton and Miller.

In the negative, none.

It was moved by Dr. Miller and seconded by Mr. Hill to renew the license of F. A. S. Kautz to conduct a maternity boarding house and lying-in hospital at 2839 Clifton Avenue, Cincinnati, giving permission to keep four women or four children.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill, Sutton and Miller.

In the negative, none.

It was moved by Dr. Miller and seconded by Mr. Hill that the Board refuse a license to Mrs. Daisy Elizabeth Huffman to conduct a maternity boarding house and lying-in hospital at Baldwin's Corners, Richfield Township, Summit County, owing to deficiency in lighting and ventilating said house.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill, Sutton and Miller.

In the negative, none.

The Secretary presented a list of health officers, appointed by their respective councils, to serve in lieu of a board of health.

It was moved by Dr. Miller and seconded by Dr. Grube that these health officers be approved.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill, Sutton and Miller.

In the negative, none.

Dr. Miller presented a report on the question of licensing maternity boarding houses in Cleveland and moved that the Secretary be instructed to notify the Cleveland board of health that the State Board of Health would not approve any maternity boarding house or lying-in hospital in the city of Cleveland unless the application for such license had received the endorsement of that board.

This motion was seconded by Dr. Grube. Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill, Sutton and Miller.

In the negative, none.

The Secretary presented the resignation of Mr. Allen C. Lucas as a member of the engineering staff.

On motion of Mr. Hill, seconded by Dr. Miller, the resignation was accepted, the time to be fixed by the chief engineer.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill, Sutton and Miller.

In the negative, none.

The Secretary presented a petition from the board of health of Cass Township, Richland County, asking the board to investigate a nuisance caused by the method of disposing of the sewage of the village of Shelby.

It was moved by Dr. Sutton and seconded by Dr. Miller to refer this complaint to a committee, consisting of the Engineering Committee and the chief engineer, for investigation and report.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill, Sutton and Miller.

In the negative, none.

It was moved by Dr. Grube and seconded by Dr. Sutton to hold the next meeting of the Board in Cincinnati, August 15th, 1912.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill, Sutton and Miller.

In the negative, none.

The Board then adjourned.

Attest:

E. F. McCAMPBELL,
Secretary.

Approved August 15th, 1912.

AUGUST 15th MEETING 1912

A regular meeting of the State Board of Health was held at the Sinton Hotel, Cincinnati, Thursday evening, August 15th, 1912, at 8 P. M.

There were present Messrs. Warner, Grube, Hasencamp, Sutton and Hill.

Mr. John H. Gregory, representing the firm of Hering and Gregory of New York, consulting engineers, appeared, by authority of the council of the city of Zanesville, in answer to a request from the Board for definite information in regard to the development of a new water supply for that city. Mr. Gregory presented a written statement to the effect that plans were being made for the development of a water supply to be taken from wells located in the valley of the Muskingum River north of the city. He stated that it was proposed to first install a small number of wells to determine the probable amount of water obtainable from such source and asked for an extension of the time within which to submit to the State Board of Health detailed plans for the improvement of the water supply.

On motion of Mr. Hill, seconded by Dr. Hasencamp, it was voted to extend to November 21st, 1912, the time within which detailed plans for the development of this proposed water supply be submitted to the State Board of Health for approval; and also to require that satisfactory tests be made of the water field before arrangements are made for the installation of any considerable number of wells and that the results of these tests be furnished to the State Board of Health before all the wells are installed.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Grube, Sutton and Hill.

In the negative, none.

Mr. J. B. T. Bold, city solicitor for Canal Dover, appeared before the Board and asked for a reconsideration of the action of July 18th, 1912, withholding approval of plans for proposed sewerage for District No. 3. He requested that plans for sewers for this district be approved and presented the following communication defining the attitude of council on the installation of a sewage disposal plant:

"CANAL DOVER, OHIO, August 13th, 1912.

"It was moved by Councilman VonKaenel and seconded by Councilman Zeigler that the director of public service be and he is hereby directed and authorized

to cause plans and specifications for a 'Sewage Purification Plant' to be prepared by the city engineer, in compliance with the orders of the State Board of Health and investigate and report as to proper location therefor. And the director of public service is also directed and authorized to cause plans to be prepared for a sanitary sewer system for that part of the city south of the river, and that the investigation as to a proper location for said plant be made with the end in view of serving that system, when installed, south of the river.

"After a thorough discussion of the above motion the roll was ordered called, whereupon Ream voted yes; VonKaenel, yes; Breitenstein, yes; Ziegler, yes; Geib, yes; Williams, yes. Motion carried.

"I hereby certify that the foregoing motion was duly passed at the stated meeting of the council of the city of Canal Dover, Tuscarawas County, Ohio, held on the 5th day of August, 1912.

(Signed) CLETUS WEAVER,
Clerk of Council."

On motion of Mr. Hill, seconded by Dr. Sutton, the former action of the Board was reconsidered and sewers for District No. 3 Canal Dover were approved provided plans for sewage purification be presented to the Board for approval within 90 days from this date. (November 15th, 1912).

Those voting in the affirmative were Messrs. Warner, Hasencamp, Grube, Sutton and Hill.

In the negative, none.

Mr. J. C. Hudson of Portsmouth, resident engineer for Messrs. Warner and Brown of Buffalo, N. Y., consulting engineers for the city of Portsmouth, appeared before the Board in reference to approval of plans for that part of the public water supply improvement relating to the filter system.

On motion of Mr. Hill, seconded by Dr. Grube, it was voted to defer action on these plans until the September meeting of the Board.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Grube, Sutton and Hill.

In the negative, none.

Mr. Schunck, of Minster, appeared in reference to plans for a public water supply for that village.

The Board then went into executive session.

On motion of Mr. Hill, seconded by Dr. Sutton, the minutes of the July 18th, 1912, meeting were approved.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Grube, Sutton and Hill.

In the negative, none.

On motion of Dr. Hasencamp, seconded by Mr. Hill, the monthly report of the Secretary was approved.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Grube, Sutton and Hill.

In the negative, none.

On motion of Mr. Hill, seconded by Dr. Sutton, the report of the Finance Committee was approved. This report being a statement of the expenditures from July 16th to and including August 15th, 1912, and balances on August 15th, 1912.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Grube, Sutton and Hill.

In the negative, none.

Mr. Hill presented the following report of the Executive Committee:

"To the State Board of Health.

GENTLEMEN:—Your Executive Committee begs to submit the following recommendations:

1. That the salary of Mr. Fred Berry, assistant bacteriologist, be increased to \$2,000 per year beginning August 15th, 1912.

(As is well known to the Board, Mr. Berry has been a very satisfactory and faithful employe. He has been especially active in developing the plans for our new laboratories in the Hartman Building, and has shown a great interest in the laboratory side of public health work. An increase in Mr. Berry's salary is made possible by the fact that R. T. Kennedy, an assistant bacteriologist has resigned and a portion of his salary which is remaining will be available for the increase of Mr. Berry. There will still be remaining in this fund the sum of \$40 per month for assistants, until the new appropriations which will be due February 15th, 1913.)

2. That the President and the Secretary be empowered to appoint a man to assist in the laboratory, in place of Mr. Kennedy, when occasion demands.

3. That the Secretary be empowered to secure necessary stenographic help for the Engineering Department during the vacation periods of the stenographers.

4. That the following books be purchased:

1 Fuller's Sewage Purification.....	\$5 00
1 Sahli's Diagnostic Methods (Saunders) last edition.....	6 50
1 Hygiene of Transmissible Diseases (Abbott).....	2 50
1 Acute Contagious Diseases (Wm. Welch & Schamberg).....	5 00
1 Practical Hygiene (Harrington) last edition.....	4 50
1 The Principles of Hygiene (Bergey) last edition.....	3 00
1 Jacoby's Dermographs	24 00

5. That the President and Secretary be directed to visit the laboratories of the Rockefeller Institute for Medical Research in New York City immediately following the meetings of the American Public Health Association, the Conference of State and Provincial Boards of Health and the International Congress on Hygiene and Demography, in Washington, D. C., September 18-28, 1912.

(Epidemic Anterior Poliomyelitis (Infantile Paralysis) is present in several localities in the state. Twenty-five cases of this disease, with several deaths, have occurred at Barborton, Ohio. The Secretary contemplates making it possible for the staff in the Hygienic Laboratories and himself to take up some active research in regard to this disease. The Rockefeller Institute for Medical Research has been investigating this disease for some time and it is thought advisable and that much good could be gained by a visit of a day or two to this institution in preparation for our work in Ohio. The Secretary has arranged with the authorities of

the Ohio State University to take charge of any experimental animals which cannot be handled in our laboratories, such as monkeys, etcetera. The laboratories of bacteriology at the Ohio State University will also be available to supplement the facilities of our own Hygienic Laboratories.)

Respectfully submitted,

FRANK WARNER, *Chairman.*

JOHN W. HILL, *Member.*

August 15, 1912

On motion of Dr. Grube, seconded by Dr. Sutton, the report with recommendations was accepted and approved.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Grube, Sutton and Hill.

In the negative, none.

Mr. Hill presented his report as Engineering Committee and the matters were taken up in the following order:

It was moved by Dr. Grube and seconded by Dr. Sutton to approve the proposed public water supply for New Carlisle, already installed, request for approval of same having been received from Mr. H. S. Forgy, mayor, August 9th, 1912, subject to the following conditions:

1st. That the village council pass an ordinance preventing the establishment of privy vaults, cesspools, or other sources of pollution, within 500 feet of the public supply wells; said ordinance to be approved by the Secretary of the State Board of Health before its passage;

2nd. That detailed plans and specifications of the development of the supply be submitted to the State Board of Health; and,

3rd. That a process for the removal of the iron from the water supply be installed when deemed necessary by the State Board of Health.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Grube, Sutton and Hill.

In the negative, none.

The Secretary was instructed to advise the authorities of New Carlisle that complete records of the operation and maintenance of the water works should be kept.

It was moved by Dr. Grube and seconded by Dr. Sutton to approve the proposed water supply for the mining camp of The Provident Coal Company, near Fairpoint, to be obtained from an impounding reservoir in Wheeling Creek two miles above Fairpoint, and plans and specifications for a water purification plant, submitted by Messrs. George S. Baton & Company of Pittsburgh, engineers for the said company, subject to the following conditions:

1st. That a competent operator, satisfactory to the State Board of Health, be placed in charge of the plant;

2nd. That accurate records of the operation including the quantity of water filtered be maintained and furnished to the State Board of Health at monthly intervals;

3rd. That revised plans providing for a more suitable method of supplying the coagulant, satisfactory to the engineers of the State Board of Health, be submitted before the contract for the installation of the plant is awarded; and,

4th. That this approval be void unless revised plans for the coagulant feed shall have been submitted prior to November 1st, 1912, and the plant installed prior to September 1st, 1913.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Grube, Sutton and Hill.

• In the negative, none.

The Secretary was instructed to inform the Provident Coal Company that this Board is of the opinion that the quantity of water available from the impounding reservoir may be insufficient during dry seasons, and that it may be found necessary to increase the size of the reservoir.

It was moved by Dr. Grube and seconded by Dr. Sutton to approve the plans for a proposed water supply for New Concord, submitted by Mr. F. H. Eno, consulting engineer for The New Concord Real Estate Company, on August 12th, 1912, subject to the following conditions:

1st. That as soon as possible after the development of the source of the supply, a comprehensive test be conducted to determine the quality and available quantity of the proposed supply, and that the State Board of Health be informed in advance of the time and manner of conducting such tests;

2nd. That if at any time in the future the quality or available quantity of the supply, in the opinion of the State Board of Health, shall have deteriorated, a new source of supply satisfactory to the State Board of Health shall be installed;

3rd. That a process for iron removal, satisfactory to the State Board of Health, be installed when deemed necessary by said Board;

4th. That the council of the village pass an ordinance preventing the establishment of any privy vault, cesspool, or other source of pollution, within 1000 feet of the source of supply in a northerly, southerly, or westerly direction, and within 500 feet of the source in an easterly direction; and,

5th. That this approval be void unless the proposed supply shall have been installed prior to September 1st, 1913.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Grube, Sutton and Hill.

In the negative, none.

The Secretary was instructed to inform The New Concord Real Estate Company that this Board is not assured of the availability of a sufficient quantity from the proposed source of water supply and that past experience has demonstrated the difficulty of obtaining a permanent supply by infiltration lines or galleries.

It was moved by Dr. Grube and seconded by Dr. Sutton to approve the public water supply of East Youngstown, obtained from Hamilton Lake, the source of the public water supply of Struthers, and furnished by The Mahoning Valley Water Company, approval of which was requested in a communication received from Mr. M. E. McCaskey, general manager of said company, on May 4th, 1912, subject to the following conditions:

1st. That to improve the quality of the supply, a purification plant of a design satisfactory to the State Board of Health be installed;

2nd. That this approval be considered void unless a purification plant satisfactory to the State Board of Health shall have been installed prior to October 1st, 1913.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Grube, Sutton and Hill.

In the negative, none.

It was moved by Dr. Grube and seconded by Dr. Sutton to approve the plans and specifications for the development of the proposed water supply for Navarre, submitted by Mr. L. E. Chapin, consulting engineer for the village, on July 29th, 1912.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Grube, Sutton and Hill.

In the negative, none.

It was moved by Dr. Grube and seconded by Dr. Sutton to hold in abeyance approval of the existing water supply of Newark and the proposed extension of the supply as shown on a plan received from Mr. James McCarthy, director of public service, on July 25th, 1912, and that the city officials be advised;

(1) That a number of examinations of the existing water supply, installed in 1909 and obtained from infiltration wells, have demonstrated that water of insufficient quantity and at times unsatisfactory quality, dependent somewhat upon the stage of the river, is obtained.

(2) That the extension of the infiltration wells may not materially increase the available yield or improve the quality of the supply; and that insufficient data have been submitted to the Board to demonstrate that a sufficient quantity is available.

(3) That the feasibility of infiltration wells at Newark to provide a water supply of satisfactory quantity and quality has not been sufficiently demonstrated to warrant the approval of the State Board of Health; and the Board will permit of the installation and temporary use of additional units only upon the condition that the supply be improved or that a new supply be secured, satisfactory to the State Board of Health, when deemed necessary by said Board.

(4) In view of the uncertainty of the supply from infiltration wells, the question of installing a purification plant should be investi-

gated, and an engineer experienced in water purification should be retained for this purpose.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Grube, Sutton and Hill.

In the negative, none.

It was moved by Dr. Grube and seconded by Dr. Sutton to approve the proposed additional water supply for Canal Dover, to be obtained from wells drilled 200 feet or more in depth and located on the site of the existing supply wells, subject to the following conditions:

1st. That the district within 1000 feet of the wells be provided with watertight sewers discharging at a suitable point of outlet to be approved by the State Board of Health; and that after these sewers are built the city council by ordinance provide for the abandonment, cleaning, disinfecting and filling with earth or ashes all privy vaults and cesspools within a radius of 1000 feet of the wells; and,

2nd. That the city maintain sanitary supervision over the district within 1000 feet of the wells, to prevent the accumulation of any material which might cause a deterioration of the water supply.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Grube, Sutton and Hill.

In the negative, none.

The Secretary was instructed to advise the authorities that this Board is of the opinion that a safer water supply than is at present provided may be obtained from wells located east of the city and penetrating the same formations from which the existing wells draw their supply.

It was moved by Dr. Grube and seconded by Dr. Sutton to withhold approval of the use of copper sulphate in the treatment of the public water supply of Lima, request for approval having been received from Mr. F. E. Harman, director of public service, on June 8th, 1912; and to instruct the Secretary to cite representatives of the city of Lima; comprising a committee composed of the mayor, the director of public service, a representative of council, and others, to appear before the State Board of Health at its next regular meeting, to be held in the office of the said Board in Columbus, September 12th, 1912, at 8 p. m., and present to the Board the attitude of the city officials regarding the public water supply and definitely state what steps will be taken in the future to improve it.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Grube, Sutton and Hill.

In the negative, none.

It was moved by Dr. Grube and seconded by Dr. Sutton to approve the plans and specifications for a water purification plant for Willoughby, submitted August 6th, 1912, by Messrs. Burgess and Long of Columbus, consulting engineers for the village, subject to the following conditions:

1st. That plans of the intake, showing the proposed source from which the raw water will be derived, be submitted to and receive the approval of the State Board of Health;

2nd. That samples of the filtering material be submitted to and receive the approval of the engineer of the State Board of Health before being placed;

3rd. That the village employ as an operator a man competent in the supervision of water purification plants; that complete records of the operation of the plant be maintained and furnished the State Board of Health at monthly intervals; and that the village arrange to have made occasional examinations of the raw and filtered water by a competent analyst to determine the efficiency of the plant;

4th. That detailed plans and specifications of the loss of head gages and rate controllers be submitted to the engineer of the State Board of Health before being installed; and,

5th. That this approval shall be void unless the water purification plant shall have been installed prior to January 1st, 1914.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Grube, Sutton and Hill.

In the negative, none.

The Secretary was instructed to call the attention of the consulting engineers to the desirability of providing baffles at the inlet ends of the coagulation basins to break the velocity of the inflow, and a sewer connection from the effluent lines from the filters to make possible re-washing the filters.

It was moved by Dr. Grube and seconded by Dr. Sutton to approve the revised plans for a proposed improvement and enlargement of the water purification plant at Youngstown, received July 16th, 1912, from Mr. F. M. Lillie, city engineer, request for approval having been received from Mr. Veeder Heasley, director of public service, on July 10th, 1912, subject to the following conditions:

1st. That samples of the filtering material be submitted to and approved by the engineer of the State Board of Health before being placed;

2nd. That the design of the coagulating basins be revised satisfactorily to the engineer of the State Board of Health by the provision of baffles to distribute the flow and provide uniform displacement;

3rd. That loss of head gages and controlling apparatus be installed for the new filters as well as for the old units, and that detailed plans of these features be submitted to and approved by the engineer of the State Board of Health;

4th. That that portion of the proposed new clear well which includes the westerly half of the present coagulating basin be provided with a substantial cover;

5th. That complete revised specifications of the proposed improvement be submitted to the State Board of Health;

6th. That the city provide for analytical control of the plant by the employment of a competent analyst and superintendent to be regularly in charge of the operation of the plant;

7th. That as soon as the proposed enlargement shall have been completed, the existing filters be completely overhauled and placed in perfect working condition;;

8th. That the plant be altered, repaired, or enlarged, and that the method of its operation be modified, when required by the State Board of Health; and.

9th. That this approval be considered void unless contracts for the installation shall have been awarded prior to January 1st, 1913.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Grube, Sutton and Hill.

In the negative, none.

The Secretary was instructed to call the attention of the authorities to the necessity of submitting to the State Board of Health for approval plans for the improvement of the water supply contemplated by the installation of a storage reservoir on the Mahoning River above Newton Falls and by the extension of the water works intake above local sources of pollution.

It was moved by Dr. Grube and seconded by Dr. Sutton to approve the plans for a proposed system of sanitary sewers and a sewage purification plant for New London, submitted by The W. J. Sherman Company of Toledo, consulting engineers for the village, on August 10th, 1912, subject to the following conditions:

1st. That approval of the proposed location for the sewage purification plant be held in abeyance pending the proposal of the village to begin construction;

2nd. That the sewage purification plant be constructed in accordance with the plans, before connections to the sewers are made;

3rd. That before connections to the sewers are permitted the village council pass an ordinance, satisfactory to the Secretary of the State Board of Health, which will regulate the use of the sewers;

4th. That samples of all filtering material be submitted to and approved by the engineer of the State Board of Health before being placed;

5th. That detailed plans of the automatic dosing apparatus be submitted to the State Board of Health before being installed;

6th. That the village appoint a competent operator, satisfactory to the State Board of Health, to have general supervision of the sewage system and purification plant; and.

7th. That this approval be considered void unless the proposed sewers and sewage purification plant shall have been constructed prior to January 1st, 1915.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Grube, Sutton and Hill.

In the negative, none.

It was moved by Dr. Grube and seconded by Dr. Sutton to approve the plans for a proposed deferrization plant for Minster, submitted by Mr. George Champe of Toledo, consulting engineer for the village, on July 24th. and August 13th, 1912, subject to the following conditions:

1st. That the aerating device be enlarged or otherwise modified, if in the opinion of the State Board of Health such enlargement or modification shall become necessary; and,

2nd. That this approval be void unless construction shall have been commenced prior to January 1st, 1913.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Grube, Sutton and Hill.

In the negative, none.

It was moved by Dr. Grube and seconded by Dr. Sutton to also approve the water supply of Minster, assuming that the proposed deferrization plant will be installed, subject to the condition that all privy vaults and cesspools within 500 feet of the public supply wells be made water-tight.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Grube, Sutton and Hill.

In the negative, none.

It was moved by Dr. Grube and seconded by Dr. Sutton to approve the plans for a proposed system of sanitary sewers and a sewage purification plant for Granville, submitted by The W. J. Sherman Company of Toledo, consulting engineers for the village, on August 10th, 1912, subject to the following conditions:

1st. That the proposed sewage purification plant be constructed in accordance with the plans, before connections to the sewers are made;

2nd. That before connections to the sewers are permitted, the village pass an ordinance, satisfactory to the State Board of Health, which will regulate the use of the sewers;

3rd. That samples of all filtering material be submitted to and approved by the engineer of the State Board of Health before being placed;

4th. That detailed plans of the automatic dosing apparatus be submitted to the State Board of Health before being installed.

5th. That the village appoint a competent operator, satisfactory to the State Board of Health, to have general supervision of the sewerage system and purification plant.

6th. That this approval be considered void unless the proposed sewers and sewage purification plant shall have been constructed prior to January 1st, 1914.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Grube, Sutton and Hill.

In the negative, none.

The Secretary was instructed to urge the officials of the village and of Denison University to co-operate with the view of connecting the sewerage system of the university with the village sewers and thus provide for the abandonment of the disposal field of the university, which is objectionable.

It was moved by Dr. Grube and seconded by Dr. Sutton to approve the plans for proposed sewerage and sewage purification for Brooklyn Subdivision No. 2 of The Citizens Land and Improvement Company of Cleveland, submitted by Mr. R. Winthrop Pratt, consulting engineer, on August 10th, 1912, subject to the following conditions:

1st. That samples of the filtering material be submitted to and approved by the engineer of the State Board of Health before being placed;

2nd. That The Citizens Land and Improvement Company employ a caretaker to visit the plant at least twice each week and attend to its proper operation;

3rd. That underdrains be provided in the proposed sludge trench to bring about the rapid drainage of the sludge without nuisance;

4th. That the entire plant be abandoned and removed as soon as sanitary sewers for the district shall have been constructed by the city of Cleveland; and,

5th. That this approval be considered void unless the proposed sewer and sewage purification plant shall have been constructed prior to January 1st, 1913.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Grube, Sutton and Hill.

In the negative, none.

It was moved by Dr. Grube and seconded by Dr. Sutton that the village of Kennedy Heights be permitted to connect its system of sanitary sewers to the sewage purification plant at Pleasant Ridge, now under construction, as requested in a communication received from The W. J. Sherman Company of Toledo, consulting engineers for Pleasant Ridge, and Mr. J. A. Stewart, village engineer for Kennedy Heights, on August 9th, 1912, subject to the condition that the sewage purification plant at Pleasant Ridge be enlarged in a manner satisfactory to the State Board of Health when deemed necessary by said Board.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Grube, Sutton and Hill.

In the negative, none.

It was moved by Dr. Grube and seconded by Dr. Sutton that the Board adopt the following resolution, declaring the necessity for sanitary sewerage for Main Sewer District No. 2 Lucas County:

WHEREAS, The board of county commissioners of Lucas County, Ohio, pursuant to the provisions of Section 1 of an act of the General Assembly of the State of Ohio, passed May 31, 1911, approved June 8, 1911, and entitled "An act authorizing the Board of County Commissioners of the several counties of the state to provide for the construction of sewers outside of the municipalities and to provide for the payment of the cost and expense thereof," have laid out and established Lucas County, Ohio, main sewer district No. 2, within that portion of said county which lies within three miles of an incorporated city, to-wit: The lots and lands in that part of Town 9 South, Range 7 East, Michigan Survey, in Lucas County, Ohio, lying and being within the following described boundaries, to-wit:

Beginning at a point where the east and west center line of Section 13 intersects the Northwest shore of Ten Mile Creek (Ottawa River, so-called); thence, West along the center lines of Sections 13, 14, and 15; to the center of Section 15; thence South along the North and South center line of Section 15 to the North line of Section 22; thence, East along the North line of Section 22 to the West line of Section 23; thence, South along the West line of Section 23 to the Northwesterly shore of Ten Mile Creek (Ottawa River, so-called); thence, Northeast-erly along the Northwesterly shore of Ten Mile Creek, (Ottawa River, so-called) to the place of beginning, and,

WHEREAS, This Board, upon investigation finds that a main sewer is necessary in the above described district, therefore,

Be it resolved, That, pursuant to the provisions of Section 2, of an Act of the General Assembly of the State of Ohio, passed May 31, 1911, approved June 8, 1911, and entitled, "An act authorizing the Board of County Commissioners of the several counties of the State to provide for the construction of sewers outside of the municipalities, and to provide for the payment of cost and expense thereof," it is necessary to construct a main sewer in Lucas County, Ohio, main sewer district No. 2, and,

Be it further resolved, That the board of county commissioners of Lucas County, Ohio, are hereby respectfully requested to have prepared the necessary plans and specifications for a main sewer and sewage purification plant in Lucas County, Ohio, main sewer district No. 2, and submit the same to the State Board of Health for approval.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Grube, Sutton and Hill.

In the negative, none.

Mr. Hill then presented the following resolution relative to the submission of plans presented for consideration by the Board:

WHEREAS, The State Board of Health has frequently received from engineers and municipal officials plans for water supply and sewerage improvements, which plans have been improperly prepared, based upon insufficient or inaccurate data and have contained features known to be unsuitable; and,

WHEREAS, Such plans after having been referred to the engineer of the Board, have caused needless work on the part of the Engineering Department in reporting upon them, and unnecessary attention on the part of the Engineering Committee and the Board members in considering such reports; and,

WHEREAS, Considerable useless labor in the preparation and consideration of unnecessary reports can be obviated with no loss of efficiency of the Board; therefore

Be it resolved, That the Board hereby directs and confers its authority upon its engineer to reject upon his discretion, plans for water supply and sewerage improvements which may be referred to him, if in his opinion such plans are improperly prepared, based upon insufficient or inaccurate data and contain features known to be unsuitable.

On motion of Mr. Hill, seconded by Dr. Hasencamp, the resolution was adopted.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Grube, Sutton and Hill.

In the negative, none.

Dr. Grube presented the following report of a committee on the selection of a bacteriologist:

"To the Members of the State Board of Health.

GENTLEMEN:—Your committee appointed on July 18, 1912, to consider the proposition of a Chief of the Hygienic Laboratories begs leave to report as follows:

Your committee unanimously recommends the appointment of Thomas R. Brown, Ph. D., for this position. The committee has given very careful consideration to this matter and has received communications from several of the leading scientists of the country recommending Dr. Brown. Among these gentlemen recommending Dr. Brown may be mentioned Dr. Wm. H. Welch of Johns Hopkins University; Dr. W. W. Ford of Johns Hopkins University; Dr. F. G. Novy, University of Michigan; Dr. F. D. Chester of the Delaware State Board of Health. Dr. Phillips, the then acting chief sanitary officer of the Government at Panama, and Dr. Cooper, the then president of the State Board of Health of Delaware, both state that his services have been satisfactory. Your committee feels that it will be extremely difficult to find a man of better training than Dr. Brown. He has the following training, to-wit: He was graduated from the University of Michigan, after which he spent a year and a half in special study with Dr. Novy on toxins, antitoxins, vaccines, etc. From here he went to the Delaware State Board of Health, where he worked with Professor Chester for some three years, resigning in order to go abroad to complete his medical work at the University of Berlin and also to study the proposition of sewage disposal and water filtration in the various countries. On returning to this country Dr. Brown was appointed bacteriologist of the Isthmian Canal Commission and remained in Panama for twenty-eight months. He resigned from this department in order to take up research work at Johns Hopkins University. He has been at Johns Hopkins University for the past three years, being given the degree of Doctor of Philosophy on June 11th. He has several publications on public health matters and they are worthy of note.

Very respectfully submitted,

(Signed) FRANK WARNER, *President.*

R. H. GRUBE, *Member,*

E. F. McCAMPBELL, *Secretary.*

On motion of Mr. Hill, seconded by Dr. Hasencamp, this report was accepted and adopted.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Grube, Sutton and Hill.

In the negative, none.

A list of health officers, appointed by their respective councils to serve in lieu of a board of health and properly endorsed, was presented.

On motion of Dr. Sutton, seconded by Mr. Hill these health officers were approved.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Grube, Sutton and Hill.

In the negative, none.

The Secretary informed the Board that numerous complaints had been received relative to the water supply of Ironton.

On motion of Dr. Hasencamp, seconded by Dr. Sutton, the Secretary was instructed to notify the mayor and council and the citizens of Ironton that the order of the State Board of Health, issued under the Bense Act, requiring the city of Ironton to purify its water supply, is in the hands of the Governor and Attorney General for their approval and that all complaints relative to the present condition of the water supply should be addressed to the Governor, a copy of such notice to be sent to the newspapers of Ironton. The Secretary was also directed to send to the Governor a digest of the actions of the Board relative to the securing of a pure water supply for the city of Ironton, to call his attention to the order submitted to him and the Attorney General on February 18th, 1911, for their approval, and to state that all complainants would be notified to address their complaints to him.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Grube, Sutton and Hill.

In the negative, none.

The Secretary presented a communication from the board of control and the city council of Akron, asking for a reconsideration of the Board's action disapproving plans for sewage and garbage disposal for that city.

On motion of Dr. Sutton, seconded by Mr. Hill, the Secretary was instructed to notify the authorities of Akron that it is the sense of the State Board of Health that no new facts have been presented for the consideration of the Board that will warrant the reopening of the matter of sewage and garbage disposal for the city of Akron, and further that the Board declines to reopen the consideration of this matter unless there be furnished in writing such new facts explained by detailed plans and specifications where necessary.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Grube, Sutton and Hill.

In the negative, none.

The Secretary presented the following resolution adopted by the executive committee of The Ohio Society for the Prevention of Tuberculosis, adopted April 11th, 1912, and a statement showing the necessity of requiring reports of tuberculosis cases:

"WHEREAS, Tuberculosis is a contagious and infectious disease and therefore a preventable disease; and

WHEREAS, The first object to be obtained in the prevention of tuberculosis is knowledge of the existence of the disease and the location of the individuals afflicted with the disease; and

WHEREAS, The law of the state of Ohio contains no provision whereby physicians in the State are required to notify the local boards of health of the discovery of a case of tuberculosis, nor any provision whereby the local boards of health are required to report to the State Board of Health such notification by the physicians; therefore be it

Resolved, That the Ohio Society for the Prevention of Tuberculosis respectfully requests that the Ohio State Board of Health place tuberculosis in the list of reportable diseases in accordance with the authority vested in that Board by Sections 1243, 4427, and 4476 of the Laws of Ohio."

On motion of Dr. Grube, seconded by Dr. Hasencamp, it was voted to place tuberculosis in the list of reportable diseases, and the Secretary was instructed to notify boards of health and health officers that they should secure reports of this disease.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Grube, Sutton and Hill.

In the negative, none.

The Secretary presented the resignation of R. T. Kennedy, D. V. M. as a member of the laboratory staff.

On motion of Dr. Hasencamp, seconded by Dr. Grube, this resignation was accepted with regret.

The Secretary presented a summary of investigations of summer resorts and stated that other investigations would be made as time could be found aside from the regular duties of the employees.

Mr. Hill reported that he had had the Secretary prepare a digest of the actions of the Board on the following:

Pollution of Poe Ditch by sewage from Bowling Green.

Pollution of streams by wastes from The Bryan Fertilizer Company's plant.

Pollution of Sandusky River by sewage from Bucyrus.

Sewerage and sewage purification at Delaware.

Pollution of Town Creek by sewage from Van Wert.

Sewerage and sewage purification for Wilmington.

He asked that these matters be referred to the Engineering Committee for report. This was done on motion of Dr. Grube, seconded by Dr. Hasencamp.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Grube, Sutton and Hill.

In the negative, none.

On motion of Mr. Hill, seconded by Dr. Grube, it was voted to hold the next regular meeting of the Board at its offices in Columbus, September 12th, 1912.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Grube, Sutton and Hill.

In the negative, none.

On motion of Dr. Grube, seconded by Dr. Hasencamp, it was voted to leave to the Committee on Program, for the October Conference, the selection of the place and time of meeting.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Grube, Sutton and Hill.

In the negative, none.

There being no further business, on motion of Mr. Hill, the Board adjourned.

Attest:

E. F. McCAMPBELL,
Secretary.

Approved September 12th, 1912.

SEPTEMBER MEETING 1912

A regular meeting of the State Board of Health was held at the office of the Secretary, in Columbus, Thursday evening, September 12th, 1912, at 8 o'clock.

There were present Messrs. Warner, Hasencamp, Grule, Hill and Sutton.

A delegation from Akron, with Mayor Frank W. Rockwell as spokesman, appeared and requested the Board to hold a special meeting in Akron to consider the question of sewage and garbage disposal for that city. The matter was referred to executive session.

A delegation from Lima, consisting of F. E. Harman, director of public service, W. S. Jackson, city solicitor, and Messrs. Standish, Flinchbaugh and Clapper, members of council, was present in response to a citation to appear and present to the Board the attitude of the city of Lima regarding the public water supply and definitely state what steps would be taken in the future to improve it. Mr. Jackson spoke of past actions of the Board and of the efforts of the city officials to improve the condition of the water supply. The matter was informally discussed by Dr. Warner, Mr. Hill, Mr. Dittoe and Mr. Harman.

It was decided to consider the necessity of improving the public water supply of Lima at the October meeting of the Board and to refer the matter to the Engineering Department for data concerning the present condition of the supply and for recommendations for future action by the city officials. This data and recommendations to be presented at the October meeting and the Lima officials to be present at that time.

Mr. Mason Evans, president, and Mr. Wise, engineer, of The Mahoning Valley Water Company, appeared with reference to the water supply of Struthers and East Youngstown. Mr. Evans presented a statement relative to the condition of the water supply and requested that the order of the Board for water purification works be withdrawn and that a committee be appointed to investigate the source of supply. The matter was referred to executive session.

The Board then went into executive session.

Dr. Sutton moved that a special meeting of the Board be held in Akron, October 10th, 1912, for the purpose of hearing arguments on sewage and garbage disposal for that city; the plans presented to be acted upon at a future meeting of the Board. This motion was seconded by Dr. Hasencamp and carried.

On motion of Mr. Hill, seconded by Dr. Grube, the minutes of the August 15th, 1912, meeting were approved.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Grube, Hill and Sutton.

In the negative, none.

On motion of Dr. Hasencamp, seconded by Mr. Hill, the monthly report of the Secretary was approved.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Grube, Hill and Sutton.

In the negative, none.

On motion of Mr. Hill, seconded by Dr. Sutton, the report of the Finance Committee was approved; this report being a statement of expenditures from August 16th, to and including August 31st, 1912, and balances on August 31st, 1912.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Grube, Hill and Sutton.

In the negative, none.

Mr. Hill presented the following report of the Executive Committee:

"To the Members of the Ohio State Board of Health.

GENTLEMEN:—Your Executive Committee begs leave to submit the following report and recommendations:

Miss Emma Halderman having resigned as correspondence clerk, and owing to the fact that an additional clerk is needed in the Engineering Department, it is recommended:

1. That Miss Corinne Dwight be made correspondence clerk at a salary of \$75 per month.

(Miss Dwight has been connected with the State Board of Health since 1905, and has at all times been especially conscientious in her work, rendering efficient service. Her present salary as general clerk is \$70 per month.)

2. That Miss Rose Smith be made a general clerk, at a salary of \$60 per month.

(Miss Smith has been employed as stenographer in the Engineering Department since 1906, and has been especially competent and faithful in her work. In the opinion of the committee she deserves some recognition for this long period of service. Miss Smith's present salary is \$50 per month.)

3. That the salary of Mr. Leo Ey be increased to \$70 per month.

(Mr. Ey has been connected with the State Board of Health since April, 1907, and is one of its most trusted and faithful employees. His present salary is \$60 per month. He is very efficient, having familiarized himself with all phases of public health work in the office.)

4. That Miss Helen O'Connor be appointed an extra clerk at a salary of \$60 per month.

(Miss O'Connor has had quite extensive experience as head stenographer in the office of Sargent & Pryce, insurance agents, and comes very highly recommended. Her appointment will make the number of employees of the Board exactly the same as before the resignation of Miss Halderman.)

5. That Miss Zoe Bradley be appointed an extra clerk at \$60 per month.

(Miss Bradley has for a number of years served as a general and medical stenographer for various physicians in Columbus, and is highly recommended for her efficiency. This appointment is necessitated by the great increase of work in the Engineering Department, the present corps of assistant engineers being unable to keep up to date with their work.)

6. That the following purchases be made:

1 Underwood No. 5 typewriter, \$102.50 less 20 percent.....	\$82 00
1 typewriter desk	30 00
1 desk chair	8 00

Approximately \$120 00

(These are necessary for the new clerk.)

7. 16106 Polariscope—Laurents. \$125 00

(To be paid for from the expense fund for pathological work.)

8. 4319 electric blower—Cromwell's..... \$73 00

1 h. p. moter—electric.

Respectfully submitted,

(Signed) FRANK WARNER, *Chairman*,
JOHN W. HILL, *Member*."

Sept. 12, 1912.

On motion of Dr. Grube, seconded by Mr. Hill, this report was accepted and approved.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Grube, Hill and Sutton.

In the negative, none.

Mr. Hill presented his report, as Engineering Committee, and the matters were taken up in the following order:

On motion of Dr. Sutton, seconded by Dr. Grube, the plans and specifications for proposed additional sewerage for Napoleon, submitted by Mr. Henry Koble, village engineer, on August 9th, 1912, were approved subject to the following conditions:

1st. That the outlet for the dry weather flow be located at a point opposite the existing outlet, approximately 1000 feet below the proposed location;

2nd. That the village have a complete examination immediately made of that portion of the Haly Avenue sewer discharging into the Maumee River a few hundred feet below the water works intake, with a view to locating all connections to the sewer used for sanitary purposes; and that the village council by ordinance provide for the immediate abandonment of all such connections;

3rd. That the sewage from the entire village be purified in a manner satisfactory to the State Board of Health when deemed necessary by said Board; and,

4th. That this approval shall be void unless plans providing for an extension of the outlet be submitted prior to January 1st, 1913, and the proposed system installed prior to January 1st, 1914.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Grube, Hill and Sutton.

In the negative, none.

The Secretary was instructed to inform the authorities of the village (1) That it is possible that the discharge at Napoleon may influence the quality of the water supply of the village during certain meteorological conditions; (2) that even if this effect were not apparent the water supply is obtained from a stream polluted by sewage received from several communities above Napoleon; and, (3) that inasmuch as it is probable that the Maumee River will continue to receive untreated sewage in an increasing amount for a number of years, it is of the utmost importance that steps be taken to improve the quality of the water supply by the installation of a purification plant.

The Secretary was also instructed to request that a representative of the village of Napoleon be present at the next regular meeting of the State Board of Health to state what steps will be taken to improve the water supply.

On motion of Dr. Sutton, seconded by Dr. Grube, it was voted to declare the public water supply of Woodsfield unsuitable for use, and to request the officials of The Woodsfield Water Company and the village officials to appear before the Board at its next regular meeting, and state what can be done to improve the quality of the present water supply.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Grube, Hill and Sutton.

In the negative, none.

On motion of Dr. Sutton and seconded by Dr. Grube it was voted to approve the general plans for proposed additional sewerage for Athens, submitted August 24th, 1912, by Messrs. R. D. Williams, director of public service, and F. H. Beckler, city engineer, subject to the following conditions:

1st. That before contracts are awarded detailed plans, satisfactory to the engineer of the State Board of Health be submitted for the proposed sewers, showing sizes, grades, manholes, flushing facilities, construction of outlet, etc., which plans shall indicate clearly the possibility of connecting the proposed system to an intercepting sewer designed to convey the sewage from the entire city to one point of outlet;

2nd. That detailed plans for an intercepting sewer to convey the sewage from the entire city and the Athens State Hospital to one outlet, and plans showing all existing sewers within the city, be prepared and submitted to the State Board of Health.

3rd. That an intercepting sewer be constructed and that the sewage from the entire city be purified in a manner satisfactory to the State Board of Health when deemed necessary by said Board; and,

4th. That this approval shall be void unless the plans required by Condition 1 shall have been submitted prior to December 1st, 1912, and

the plans required by Condition 2 shall have been submitted prior to June 1st, 1913.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Grube, Hill and Sutton.

In the negative, none.

On motion of Dr. Sutton, seconded by Dr. Grube, the plans for a proposed system of additional sanitary sewers for Millersburg, received August 23rd, 1912, from S. H. Marchand, mayor of the village, were approved subject to the following conditions:

1st. That prior to the connection of the proposed system of sewers to the Mad Anthony Street sewer, the village have prepared and submitted to the State Board of Health plans and specifications satisfactory to said Board for a sewage purification plant, including an intercepting sewer to collect the sewage flow from the entire village at one point of outlet;

2nd. That a portion of the intercepting sewer to provide for the temporary discharge of the sewage flow from the entire village at the existing outlet of the Mad Anthony Street sewer be constructed prior to July 1st, 1913;

3rd. That the intercepting sewer be completed and the sewage purification plant be constructed at a location satisfactory to the State Board of Health when deemed necessary by said Board; and,

4th. That this approval shall be void unless plans for a sewage purification plant, including the intercepting sewer, shall be submitted prior to January 1st, 1913.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Grube, Hill and Sutton.

In the negative, none.

The Secretary was instructed to advise the village authorities that the above mentioned plans should be carefully prepared in detail and that the design of the sewers and sewage purification plant should incorporate all of the modern features; also that in the opinion of the State Board of Health, the design of the existing and proposed sewers is faulty in that inadequate flushing facilities and an insufficient number of manholes are provided.

On motion of Dr. Sutton, seconded by Dr. Grube, it was voted to approve the revised general plans and specifications for a proposed water purification plant for Portsmouth, prepared by The New York Continental Jewell Filtration Company and submitted August 13th, 1912, by Mr. J. I. Hudson, resident engineer for Messrs. Witmer and Brown, consulting engineers for the city, subject to the following conditions:

1st. That facilities for applying a coagulant to the raw water before its entrance into the subsidence basin and to the settled water prior to its application to the filters be provided;

2nd. That recording gages connected to the Venturi rate controllers be installed at each filter;

3rd. That samples of all filtering material be submitted to and receive the approval of the engineer of the State Board of Health; and that provision be made in the construction of the plant for increasing the thickness of the sand to a depth of three feet, such increase to be made when required by the State Board of Health;

4th. That the use of coagulants and sterilizing chemicals be at all times subject to the approval of the State Board of Health;

5th. That before the construction of the plant is begun detailed working drawings of all features of the installation be submitted; such plans to be satisfactory to the State Board of Health and to include the following: (a) details of the inlet and of the subsidence basin, (b) details of the method of applying a coagulant to the raw water before subsidence, (c) details of method of applying a coagulant to the settled water after its passage through the coagulation basins, and (d) details of recording gauges to indicate the rate of filtration of each filter; and,

6th. That this approval be void unless the water purification plant shall have been installed prior to January 1st, 1914.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Grube, Hill and Sutton.

In the negative, none.

On motion of Dr. Sutton, seconded by Dr. Grube, it was voted to approve the plans for a proposed system of storm sewers for Linden Heights, submitted on August 14th, 1912, by Mr. R. K. Schlaflly, engineer for the village, subject to the following conditions:

1st. That the village council pass an ordinance restricting the use of the sewers, permitting connections for surface drainage, cistern overflows, downspouts from roofs and cellar drainage; and prohibiting connections for closet wastes, sink drainage, household wastes of any kind, and cesspool overflows; and providing that cellar drains shall be constructed of field tile placed outside the foundation walls with no connection to the interior of the cellar; and that the proposed ordinance be approved by the Secretary of the State Board of Health before its passage.

2nd. That immediately following the installation of storm sewers in the future, the proposed system to be installed at present be converted into a system of sanitary sewers by disconnecting therefrom catch basins, downspouts, and cistern overflows, and providing continuance of cellar drain connections and the installation of house connections; and that plans and specifications showing the proposed method of converting the system of sewers and disposal of sewage, be submitted to and receive the approval of the State Board of Health before the conversion is made.

3rd. That this approval shall be void after October 1st, 1913, unless construction of the proposed sewers shall have been commenced prior to that date.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Grube, Hill and Sutton.

In the negative, none.

The question of the water supply for Struthers and East Youngstown was taken up for consideration.

Mr. Hill moved that the Mahoning Valley Water Company be required to present within sixty days from this date (November 12, 1912), plans for the purification of that part of the water supply used for domestic purposes. This motion was seconded by Dr. Sutton.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Grube, Hill and Sutton.

In the negative, none.

The Secretary presented a statement in regard to an investigation of sanitary conditions at Buckeye Lake Park, and the chief engineer made a resume of plans of the consulting engineer, engaged by the management of the park, for proposed sewage purification at the park, and recommended that the matter be referred to a committee with power to act so that unnecessary delays might be avoided.

On motion of Mr. Hill, seconded by Dr. Grube, the general project as outlined by plans of the consulting engineer was referred to a committee consisting of the Engineering Committee and the chief engineer, with power to act.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Grube, Hill and Sutton.

In the negative, none.

The Board then took up the complaint of the board of health of Cass Township, Richland County, against the condition of the sewage purification plant of the village of Shelby, and having before it the report of its committee (Mr. Hill and the chief engineer) heretofore appointed by this Board to investigate such conditions, the same was, on motion of Mr. Hill, seconded by Dr. Grube, ordered read. (The report was then read.)

It was moved by Mr. Hill and seconded by Dr. Grube that the Board does find upon the report of its committee and other evidence that the existing sewage purification plant of Shelby is entirely unfit to treat the sewage from the village and is, at the present time, creating a decided nuisance.

The roll call upon the adoption of this motion resulted in Yeas, Dr. Warner, Dr. Hasencamp, Dr. Grube, Mr. Hill and Dr. Sutton.

Nays, none.

Thereupon, it was moved by Mr. Hill and seconded by Dr. Sutton that the Secretary of this Board notify the authorities of Shelby of the

findings made by the Board, and that the Board has fixed 8 p. m., the 23rd day of October, in the office of the Secretary, Columbus, as the time and place, when and where the village of Shelby by its officers, or others, may have an opportunity to be heard and to show cause, if any, why said village should not be required to make extensive improvements in the disposal of the sewage of said village.

The roll call upon the adoption of this motion resulted in Yeas, Dr. Warner, Dr. Hasencamp, Dr. Grube, Mr. Hill and Dr. Sutton.

Nays, none.

The Secretary presented resolutions from the council of Reading and from the council of Lockland asking the Board to take such steps as may be necessary to abate a nuisance in Mill Creek caused by refuse from the plant of the Central Manufacturing Company, north of Lockland.

On motion of Mr. Hill, seconded by Dr. Hasencamp, the matter was referred to the October meeting.

The Secretary presented a petition, signed by twenty-eight residents of Geneva, protesting against the condition of the sewage disposal plant in that village.

On motion of Mr. Hill, seconded by Dr. Grube, the matter was referred to the Engineering Department for investigation and report.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Grube, Hill and Sutton.

In the negative, none.

The Secretary presented a communication from The Ohio Society for the Prevention of Tuberculosis, asking the Board to appoint a committee to confer with the executive committee of the society, for the purpose of considering ways and means for furthering the fight against tuberculosis.

On motion of Mr. Hill, seconded by Dr. Grube, the President was authorized to appoint such a committee.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Grube, Hill and Sutton.

In the negative, none.

The Secretary presented a letter from the State Inspector of Plumbing relative to fees assessed and collected, and made a statement relative to the work of the Inspector.

On motion of Mr. Hill, seconded by Dr. Grube, the Secretary was instructed to notify the State Inspector of Plumbing that a monthly statement of fees assessed and collected must be made to the Secretary, and a duplicate receipt from the State Treasurer be furnished for all money paid into the State Treasury by the Inspector.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Grube, Hill and Sutton.

In the negative, none.

The Secretary presented the name of Dr. Ray Nixon, as health officer for the village of Stratton, Jefferson County, Ohio, Dr. Nixon having been appointed by council to serve in lieu of a board of health until January, 1913.

On motion of Dr. Hasencamp, seconded by Mr. Hill, Dr. Ray Nixon was approved as health officer of Stratton, until 1913.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Grube, Hill and Sutton.

In the negative, none.

The Secretary presented a letter from the prosecuting attorney of Jefferson County relative to the failure and refusal of the board of health of Saline Township to cause the abatement of nuisances caused by a recent flood. The prosecuting attorney recommended that the State Board appoint William Starkey as health officer of the township.

On motion of Mr. Hill, seconded by Dr. Hasencamp, it was voted to appoint William Starkey as health officer of Saline Township, Jefferson County, for a period of three months, at \$3.00 a day for days when engaged in actual service for the board of health.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Grube, Hill and Sutton.

In the negative, none.

The Secretary presented petitions asking the Board to appoint a health officer at Bradley, and at Rhodesdale, Jefferson County, two unincorporated villages.

The matter was referred to the Secretary for action.

The Secretary presented the resignation of Emma Halderman as correspondence clerk.

On motion of Dr. Sutton, seconded by Dr. Hasencamp, the resignation of Miss Halderman was accepted.

Mr. Hill made a statement in regard to past actions of the Board under the Bense Act and moved that the matter be referred to the Secretary and the Chief Engineer for report at the next meeting of the Board on what action had been taken to carry out the orders issued by the Board under the provisions of the act and what action was proposed; the Secretary to inquire of the authorities in all cases where an order has been issued, the constitutionality of the act having been upheld by the Supreme Court, why the order of the Board has been disregarded.

This motion was seconded by Dr. Sutton.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Grube, Hill and Sutton.

In the negative, none.

Dr. Grube presented a report of an investigation of the District Tuberculosis Hospital at Springfield.

On motion of Mr. Hill, seconded by Dr. Sutton, the report was accepted and ordered filed.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Grube, Hill and Sutton.

In the negative, none.

The Secretary made a statement relative to the Conference of Boards of Health to be held October 24th and 25th, 1912.

On motion of Mr. Hill, seconded by Dr. Hasencamp, the Board adjourned to meet in Akron October 10th, 1912.

Attest:

E. F. McCAMPBELL,
Secretary.

Approved October 23rd, 1912.

OCTOBER 10th, SPECIAL MEETING

A special meeting of the State Board of Health was held at the Portage Hotel, Akron, October 10th, 1912, at 8 p. m., to hear arguments from citizens of Akron relative to sewage and garbage disposal.

Members present were Drs. Warner, Hasencamp, Grube, Sutton and Miller. Absent Messrs. Hartzell and Hill.

On behalf of the Executive Committee Dr. Warner reported the resignation of Miss Hazel Cameron, as laboratory assistant, and recommended the appointment of Miss Margaret Richter, at \$40.00 a month.

Those voting in favor of the appointment were Drs. Warner, Hasencamp, Grube, Sutton and Miller.

Mr. John H. Gregory, representing the firm of Hering and Gregory of New York, consulting engineers for the city of Zanesville, appeared before the Board in reference to the water supply of that city, but was informed that detailed plans for the proposed water supply had not been officially submitted to the Board for approval.

The Board then went into open session to hear citizens of Akron relative to sewage and garbage disposal.

Mayor Frank W. Rockwell made a general statement in regard to local conditions and the action of the Board in requiring the city to install sewage purification works. He spoke of the work carried on at the sewage testing station and stated that the report of the chemist had been handed to the director of public service that day. He then reviewed the proposition made to the city by C. D. Crouch and of efforts made to have the plans approved by the Board. He urged it to be the duty of the Board to pass upon the plans without consulting residents of the city, and stated that the city would look after the financial end of the matter. The statement was also made that the only opposition to the proposed plan had come from one of the local papers and from the Socialist party.

At the request of Dr. Warner, the mayor called upon persons present to speak concerning the matter.

A. F. Matlack spoke of the design, purposes of the plant, and methods to be used, and stated that the plans had been approved by "three of the most eminent engineers of the United States." He stated that the plans comprise the best features of sewage disposal as followed in the best installations in the world.

C. D. Crouch stated that the plant was to be built and operated without cost to the city except for delivery of sewage and garbage to the plant, and that the purpose was to build a demonstrating plant, and

further stated that the company had other propositions pending and would like to have the matter settled as soon as possible.

Mayor Rockwell spoke of the difficulties encountered in disposing of night soil and stated that such material would be taken care of at the new plant when constructed.

Dr. A. A. Kohler, health officer, spoke of the difficulty of finding a place to dispose of night soil and of finding men to do the work. He stated that conditions were getting serious. He expressed the belief that the State Board was amply protected in having authority to require a proper effluent.

James Shaw, member of council, said he was not opposed to the plan in general, but didn't want to do anything until the approval of the Board had been secured. He said he could see some merit in the plan.

J. A. Moewe, Socialist member of council, is not opposed to having such a plant, but is in favor of a municipally owned plant. He did not want the matter considered until favorable action was taken by the State Board.

Scott Kenfield, assistant city solicitor, recognizes the necessity of providing for sewage disposal by this or some other method.

Joseph Gebres, city engineer, said the city would be compelled to take some action soon toward providing sewage disposal. He does not know anything of the plans under consideration as he has never had the opportunity of examining them.

Joseph Sieberling, spoke of a liberal construction by the Board of its powers over municipal improvements and said the Board had the power to compel the proper operation of the plant and should not hold back because the project was new.

Dr. Warner said that the Board fully realized its responsibilities and had no intention of being an obstructionist and would act for the best interest of the city, but that plans for improvements must show that the improvements as constructed will be efficient.

Jonathan Taylor, city solicitor, said the city was legally protected and that they would expect the State Board of Health to look after the matter from an engineering standpoint. All local officials have expressed themselves as being in favor of accepting the proposition.

President Ziliox, of the Chamber of Commerce, said that what was wanted was positive action one way or the other without delay.

J. D. Thomas, member of the board of health, asked the Board to state what objection there was to the plans as presented.

Dr. Warner in reply stated that he was always suspicious of "something offered for nothing" and that when such a proposition was made it should have the most careful investigation.

J. F. Miller, a trustee of Portage Township, stated that residents of the township were asking for relief from the pollution of the river

and from the dumping of night soil, and hoped that the construction of a sewage disposal plant would give that relief.

Mr. Tobin said that he was not familiar with the proposition but was in favor of municipal ownership.

Mr. Firestone, is not posted on the proposition but thinks if it is a good one the city should be permitted to avail itself of the offer.

Dr. Church, president of Buchtel College, said he was not informed in regard to the proposition but realized that the city should have a plant of some kind, but did not know what kind.

Mr. Ziliox said he could not see why men should offer to spend several thousand dollars on such a proposition without some good reason.

Mr. Spalding, editor of the Beacon Journal, said he was in favor of the proposal and that his paper supported it.

Mr. Marsh, editor of The Akron Press, called attention to the work being done at the testing station at an expense of several thousand dollars and felt that the city should get the results of these tests before taking action on the Crouch proposition. He stated it to be the policy of his paper to not favor any proposition until it was thoroughly understood.

Mr. W. H. Dittoe, chief engineer of the State Board of Health, reviewed the actions of the Board relative to sewerage matters at Akron and gave some objections to be raised on the plans as submitted to his department for review. He went into some of these matters in detail and referred to Mr. J. H. Gregory, who was present, as competent to give an opinion on the questions at issue. Among the defects pointed out by Mr. Dittoe were: absence of grit chamber; deficient sprinkling device and distribution; underdrains; failure to provide for loss of head, etc.

Mr. Gregory explained the practice as followed in different plants with which he was familiar, in this country, in England and on the Continent, and stated his experience in designing such work and his observation of different methods. He upheld Mr. Dittoe in the objections raised.

Mr. A. F. Matlack explained the theory of sewage disposal upon which his plans are based and contended that his plans are based on the best to be found in sewage disposal anywhere.

Mr. Gregory replied by giving a description of some of the notable plants and methods abroad, and could not agree with Mr. Matlack as to the construction of some of the plants referred to by him.

Mr. Crouch called upon Mr. Gregory to answer certain questions relative to the Columbus plant and stated that he was informed that the plant was a failure.

Mr. Gregory replied to this, as did Dr. Warner who said that as a resident of Columbus he knew the statement to be untrue and that on the contrary the plant was doing the work which it was designed to do.

Mr. R. W. Ferris, of Akron, read an editorial from the Engineering Record in which the city of Akron was cautioned to go slow in adopting a scheme of disposal which had not received the approval of an acknowledged authority in such matters.

Mr. Moewe stated that while considering sewage disposal it should also be borne in mind that garbage disposal must be provided.

Mayor Rockwell said that Akron should be allowed to install the plant and was willing to take the risk of its being a failure; that should such prove to be the case the city could then go ahead and build another plant.

Mr. Thomas said the Board should take prompt action and not stand in the way of the improvement.

Dr. Warner in closing said that the matter would be considered at the regular meeting to be held October 23rd, and that the Board would use its best judgment in the matter; that it was the desire of the Board to act for the best interests for the city of Akron, and that should the action not be favorable to the present proposition he knew the city to be willing and able to proceed with the installation of suitable works for disposing of sewage and garbage.

The meeting then adjourned.

Attest:

E. F. McCAMPBELL,
Secretary.

Approved October 23rd, 1912.

OCTOBER MEETING 1912

A regular meeting of the State Board of Health was held at the office of the Secretary, Columbus, October 23rd, 1912, at 8 p. m.

There were present Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Sutton.

Dr. Warner, retiring president, made a few remarks concerning the work of the Board during his administration, thanked the members for their assistance, and introduced Dr. Hasencamp as president for the ensuing year.

On motion of Dr. Grube, seconded by Mr. Hartzell, the minutes of the September 12th meeting were approved.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Sutton.

In the negative, none.

On motion of Dr. Grube, seconded by Mr. Hartzell, the minutes and report of the special meeting held October 10th. at Akron, were approved.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Sutton.

In the negative, none.

On motion of Dr. Warner, seconded by Dr. Grube, the monthly report of the Secretary was approved.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Sutton.

In the negative, none.

On motion of Dr. Sutton, seconded by Dr. Grube, the report of the Finance Committee was approved; this report being a statement of expenditures from September 1st to October 15th, inclusive, 1912, and a statement of balances available on October 15th, 1912.

Dr. Warner, as chairman of the Executive Committee, submitted the following report:

To the Members of the State Board of Health.

GENTLEMEN:—Your Executive Committee begs to submit the following report and recommendations:

1. It is recommended that a map case, of special design, be made for the Engineering Department, at a cost of, approximately, \$65.00.

2. It is recommended that 30 file boxes, made of tar-board, $14\frac{1}{2}$ by $10\frac{1}{2}$ by $2\frac{3}{4}$ inches, be purchased for filing certain records in the Administrative Department, at a cost of \$22.50.

3. Elmer Boehm has been employed in the laboratory for the purpose of preparing and sending out the various outfits, at a salary of \$30.00 per month, to be paid from the fund for extra clerk hire.

Respectfully submitted,

FRANK WARNER, *Chairman*.

Oct. 23rd, 1912.

On motion of Dr. Grube, seconded by Dr. Sutton the report and recommendations were approved.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Sutton.

In the negative, none.

On calling for representatives from the city of Lima the following delegation appeared in response to a citation to show what Lima had done to comply with the order of the Board for the improvement of the public water supply; F. E. Harman, director of public service; A. S. Lytle, superintendent of water works; Messrs. Flinchbaugh, Standish and Clapper, members of council, and W. S. Jackson, city solicitor.

At the request of the Board the Secretary read the summary of a report by the chief engineer regarding the quality of the public water supply of Lima, which was as follows:

"From the foregoing resumé of results of investigations by the State Board of Health, it is evident that the public water supply of Lima has never been found satisfactory for domestic use. At times no dangerous pollution is shown, but the time of appearance of such pollution is uncertain, and the only safeguard is the purification of the supply. Almost always the physical characteristics of the water are objectionable, as it is usually somewhat turbid and impregnated with vegetable stain. It appears to be clearly shown that the water supply can be made satisfactory from a hygienic and aesthetic standpoint only by the installation of a water purification plant."

The Secretary also read the summary of a report on the Lima water supply made by Mr. Allen Hazen, consulting engineer of New York, to the mayor of Lima March 18th, 1911, said report being taken from a Lima newspaper.

The chief engineer, Mr. Dittoe, discussed the report of Mr. Hazen. He stated that the Board and Engineering Department were familiar with conditions at Lima, this knowledge coming from a study of the water supply during a period of several years and in all seasons.

Mr. Jackson said that the people of Lima were anxious and willing to improve the water supply by the installation of water purification works, and would do this as soon as the financial condition of the city

would permit, and that when the improvement is made it is the intention of the city to do it in the proper manner.

It was recommended to the city officials that the city of Lima secure competent engineering advice and take immediate steps to improve the supply.

The matter of the contamination of the water supply of Lima by wastes from the Allen County Infirmary was then taken up. The Secretary called attention to an investigation made and an order issued by the Board in 1910, requiring improvements to be made to prevent pollution from this source.

This matter was discussed by Mr. Jackson and by Mr. Van Buskirk, one of the assistant engineers, who had investigated what the city had done to protect the water supply. Mr. Jackson described the improvements that had been made and the effect of these improvements was explained by Mr. Van Buskirk. During the discussion it was found that the plans for the improvement had not been filed with the Board.

On motion of Mr. Hill, seconded by Dr. Sutton, the Secretary was instructed to address an inquiry to the city officials of Lima for information concerning these improvements, and to notify them that the Board will require the city to furnish plans showing exactly what has been done by the city to meet the requirements of the order of the Board under date of December 6th, 1910.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Sutton.

In the negative, none.

On calling for representatives from the village of Shelby, in response to a citation for a hearing, there appeared Mr. B. F. Long, village solicitor, and Mr. A. Elliott Kimberly, consulting engineer. Mr. Long stated that the village authorities realized that something must be done to improve the present sewage purification plant, and that Mr. Kimberly had been retained to make a report on the present condition of the plant and recommendation for improvements. Mr. Kimberly described the plant, as originally installed, its present condition and what will be necessary to be done to place the plant in good condition and adequate for the present sewage flow. Mr. Long also made a statement in regard to the financial condition of the village and stated that no complaints against the plant had ever been made to the village authorities.

The matter was referred to executive session.

The complaint made by the villages of Lockland and Reading against The Central Manufacturing Company was taken up, and in response to a citation to the company for a hearing, there appeared Mr. F. W. Cottell, attorney for the company, and Mr. William Callan, its secretary. Mr. Cottell made a statement in regard to the construc-

tion and operation of the plant and described improvements that are now being made to prevent the pollution of Mill Creek, and further cause for complaint.

Mr. Hill moved that the matter be held in abeyance to determine the success of the improvements. The motion was seconded by Dr. Grube and carried.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Sutton.

In the negative, none.

Messrs. D. A. Shade, E. E. Rockfield, chairman of the committee on drainage, and Carl Valentine, village solicitor, representing the village of Linden Heights appeared with a request for a modification of the terms of the Board's approval of a system of storm sewers, given September 12th, 1912. The condition complained of related to the method of draining cellars. Mr. Shade, speaking for the delegation, stated that if the Board insisted upon its condition that cellars be drained by means of drains laid outside the houses, the scheme for sewerage would be defeated, and that the village would pass any ordinance to prevent house wastes being discharged into the sewers the Board might require.

Mr. Dittoe explained the plan for sewers and the necessity for stringent regulation to prevent the contamination of the county ditch and stream receiving the drainage.

On motion of Dr. Warner, seconded by Dr. Grube, it was voted to permit the installation of inside cellar drains subject to the following conditions:

1st. That the council of the village of Linden Heights pass an ordinance providing for a cellar drain inspector, defining his duties and his authority;

2nd. That the ordinance as drawn for passage be submitted to and approved by the Secretary of the State Board of Health; and,

3rd. That on the passage of the ordinance a reliable person be appointed to the office.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Sutton.

In the negative, none.

A citation having been made for the village of Napoleon to send representatives, to state what steps would be taken by the village to improve the water supply, it was found that no representative was present, and the Secretary was instructed to notify the village authorities that the Board will expect them to send a representative to the meeting to be held at 8 p. m., November 21st, 1912, at the Havlin Hotel, Cincinnati, that the desired information may be given to the Board at that time.

In response to a citation, there appeared Mr. R. W. Kinney, superintendent, and J. E. Kinney, representing the Woodsfield Water Company, to explain what could be done to improve the quality of the present water supply of Woodsfield.

Mr. Dittoe made a statement in regard to the source and method of handling the supply, and the opportunity for its pollution. Mr. R. W. Kinney explained the resources and financial condition of the water company, and stated that the company would have to raise its water rates in order to make any improvements. He further stated that he feared that an attempt to raise existing rates would result in loss and possible litigation. This phase of the matter was discussed by Mr. Hill who stated that courts would sustain the company where it was shown that the raise in rate was necessary in order to improve the quality of the water, and that estimates of the cost of installing a purification plant could be obtained without cost to the company.

Mr. Hill then moved that the Woodsfield Water Company be required to submit, on or before the January, 1913, meeting, plans for the purification of the water supply of Woodsfield. This motion was seconded by Dr. Warner and carried.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Sutton.

In the negative, none.

Mr. G. F. Kasch, a resident of Akron, presented a communication relative to the advisability of requiring the city of Akron to immediately abandon Summit Lake as a source of water supply, and of permitting the temporary use of East Reservoir of the Portage Lake pending the completion of the new source in the Big Cuyahoga Valley twelve miles north and east of the city.

On motion of Dr. Warner, seconded by Dr. Sutton, the communication was referred to the chief engineer.

The Board then went into executive session.

The Board took up for consideration the petition of citizens of Geneva requesting the Board to take action to improve the condition of the sewage purification works of that village and to secure the abatement of a nuisance caused by refuse deposited near the said plant; and having before it the report of the chief engineer, who had been appointed by this Board to investigate these complaints, the same was on motion of Dr. Sutton, seconded by Dr. Warner, ordered read.

The report was then read.

It was moved by Dr. Sutton, and seconded by Dr. Warner, that the Board does find from the report of its chief engineer, that the village of Geneva has failed to improve its sewage purification works so as to enable them to efficiently treat the sewage of the city.

The roll call upon the adoption of this motion resulted as follows: Yeas, Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Sutton. Nays, none.

It was then moved by Dr. Warner, and seconded by Dr. Sutton, that the Secretary of this Board notify the village of Geneva of the Board's findings, and that the Board has fixed 8 p. m., Thursday, the 21st day of November, 1912, at the Havlin Hotel, Cincinnati, as the time and place, when and where the village of Geneva by its officers or others may have an opportunity to be heard, and to show cause, if any, why the said village should not be required to provide means for purifying the sewage of the village in a manner satisfactory to the State Board of Health before September 1st, 1913.

The roll call upon the adoption of this motion resulted as follows: Yeas, Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Sutton. Nays, none.

The Board also found from the report of its chief engineer that the practice of dumping refuse on the banks of Cowles Creek should be stopped, and on motion of Dr. Warner, seconded by Dr. Sutton, the Secretary was instructed to notify the authorities of Geneva that they would also have an opportunity at the November 21st meeting to show cause why the village should not be required to provide a suitable burial ground for the refuse.

The roll call upon the adoption of this motion resulted as follows: Yeas, Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Sutton. Nays, none.

The Board then took up for consideration the complaint against the village of Shelby, and representatives of the village having been given a hearing and having filed no protest or remonstrance against the action or findings heretofore made, it was moved by Mr. Hill, and seconded by Dr. Sutton that the report and recommendations therein contained be now approved and confirmed.

The roll call upon the adoption of this motion resulted as follows: Yeas, Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Sutton. Nays, none.

It was thereupon moved by Mr. Hill, and seconded by Dr. Sutton that it is hereby declared to be necessary that the village of Shelby be required within one year following the signing of the Board's order by the Governor and the Attorney General, to so reconstruct and enlarge its sewage purification plant as to provide adequate purification for the sewage of the village; and to present plans for such improvements to the State Board of Health for approval within three months following the approval of the Board's order by the Governor and the Attorney General.

The roll call upon the adoption of this motion resulted as follows: Yeas, Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Sutton. Nays, none.

Thereupon it was moved by Mr. Hill, and seconded by Dr. Sutton, that the report and findings of the Board be transmitted to the Governor and Attorney General for their action thereon.

The roll call upon the adoption of this motion resulted as follows: Yeas, Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Sutton. Nays, none.

Mr. Hill presented his report, as Engineering Committee, and the matters were taken up and disposed of in the following order:

On motion of Mr. Hartzell, seconded by Dr. Grube, the plans and specifications for proposed improvement in the water supply and for a proposed water purification plant for Alliance, prepared by Messrs. Chester and Fleming of Pittsburg, consulting engineers for the city, and received from Mr. D. M. Armstrong, director of public service, on October 5th, 1912, were approved subject to the following conditions:

1st. That all vegetation be stripped to a depth of at least six inches from ravines tributary to the main portion of the Westville reservoir, in which the depth of flooding will be 3 feet or less;

2nd. That the water works intake conduit be extended up stream in such manner and at such time as shall be deemed necessary by the State Board of Health;

3rd. That the rate controllers of the individual filter units be provided with indicating gages to show the actual rate of filtration;

4th. That facilities for applying a coagulant to the settled water prior to its application to the filters be provided when required by the State Board of Health;

5th. That the use of the coagulants and sterilizing chemicals be at all times subject to the approval of the State Board of Health;

6th. That the city employ a competent analyst, experienced in water purification, to provide accurate analytical control of the operation of the plant; and,

7th. That this approval shall be void unless construction of the water purification plant shall have been commenced prior to January 1st, 1914.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Sutton.

In the negative, none.

On motion of Dr. Grube, seconded by Mr. Hartzell, the general plan of proposed sewerage and the detailed plans for a proposed sewage purification plant for Buckeye Lake Park, submitted by Mr. A. Elliott Kimberly, consulting engineer for Mr. W. D. Harris, lessee of the park, on September 11th. and October 18th, 1912, respectively, was approved subject to the following conditions:

1st. That the installation be enlarged, or devices for secondary treatment of the sewage be installed, when deemed necessary by the State Board of Health:

2nd. That the authorities of Buckeye Lake Park employ a competent operator to attend to the disinfection and pumping of the sewage;

3rd. That the sludge be removed from the sedimentation tank at least once each year and properly disposed of by burial;

4th. That duplicate pumping equipment be installed if the failure of the proposed unit should necessitate the bypassing of the settled sewage to Waste Weir Run; and,

5th. That this approval shall be void unless the proposed installation shall have been made prior to June 1st, 1913.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Sutton.

In the negative, none.

On motion of Mr. Hartzell, seconded by Dr. Sutton, it was voted to grant the request of the authorities of New Berlin, for an extension of the time limit of the Board's approval of plans for proposed sewerage and sewage purification, given March 21st, 1912, and to revise Condition 6 of said approval to read: "That this approval shall be void unless construction of the sewers and sewage purification works shall have been commenced prior to June 1st, 1913."

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Sutton.

In the negative, none.

Mr. Hill stated that no action was necessary in the matter of sewage and garbage disposal for Akron, as the plans had been withdrawn. The Secretary then read a letter from Mr. Frank W. Rockwell, mayor of Akron, withdrawing the plans from consideration and requesting their return to the promoters.

The Secretary also reported that the mayor had filed with him a report of the chemist in charge of the sewage testing station.

On motion of Mr. Hill, seconded by Dr. Sutton, the Secretary was instructed to acknowledge receipt of the report and to inform the mayor that the Board would urge upon council the necessity of at once making provision for the installation of sewage disposal works.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Sutton.

In the negative, none.

On motion of Dr. Grube, seconded by Dr. Warner, a proposed water supply for fire protection purposes only, to be derived from wells located upon a site adjacent to the electric light plant at Payne, was approved subject to the following conditions:

1st. That the village council pass an ordinance preventing the use of the proposed water supply for domestic purposes by prohibiting the establishment of any service connections to the mains, unless such connections shall be for purposes other than domestic use, and shall have been approved by the Secretary of the State Board of Health; and that the said ordinance shall be submitted to the Secretary of the said Board for approval before its passage;

2nd. That a certified copy of the plan of the distribution system showing all connections to the mains for any purpose shall be submitted to the State Board of Health as soon as the system shall have been installed;

3rd. That prior to January 1st, 1915, the proposed supply for fire protection be abandoned and the water supply for general purposes be installed at a site satisfactory to the State Board of Health; and,

4th. That this approval shall be void unless the proposed supply for fire protection shall have been installed prior to January 1st, 1913.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Sutton.

In the negative, none.

On motion of Dr. Sutton, seconded by Dr. Grube, the proposed additional water supply for Gibsonburg, to be obtained from a drilled well located upon the existing water works property was disapproved.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Sutton.

In the negative, none.

The Secretary was instructed to call the attention of the authorities to the following facts:

1st. That the growth of the village since the installation of the water supply has brought about an encroachment upon the wells as a result of which the quality of the supply is threatened;

2nd. That the installation of additional wells upon the water works property would increase the possible draft of water and thus render more likely the entrance of pollution; and,

3rd. That if an additional water supply is required it should be obtained from wells located on a more satisfactory site, and approved by the State Board of Health, which site should be developed with a view of ultimately obtaining the entire supply from that source.

On motion of Dr. Sutton, seconded by Dr. Grube, the Secretary was instructed to notify the city officials of Cincinnati, that the installation of the system of combined sewers at Westwood was in violation of Section 1240 of the General Code, inasmuch as plans were not submitted to the State Board of Health for approval; and as a result of the installation of the combined sewers without provision for treatment of the sewage, a nuisance is caused at the outlet; and that the State Board of Health will require the city of Cincinnati to submit, prior to

January 1st, 1913, (a) Plans for a system of sanitary sewers for the district and a sewage purification plant, making possible the use of the existing system and outlet for storm water only, or, (b) Plans for a sewage purification plant to treat the dry weather flow from the existing system of combined sewers.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Sutton.

In the negative, none.

The Secretary was instructed to further advise the authorities that in the opinion of the Board a separate system of sewers should have been installed instead of the combined system which was built, and to remedy conditions it is advisable to construct an independent system of sanitary sewers.

On motion of Dr. Warner, seconded by Dr. Grube, a proposed new water supply for Gloucester, to be obtained from drilled wells located on property of the Allen heirs, in the extreme northeasterly portion of the village between the K. & M. Railroad and Sunday Creek, was approved subject to the following conditions:

1st. That prior to the installation of the supply exhaustive tests be made to demonstrate the available quantity, and that the results be submitted to the State Board of Health;

2nd. That detailed plans of the development of the supply be prepared and submitted to the State Board of Health for approval;

3rd. That a plant for the removal of the iron content be incorporated in the design and be installed if future examinations of the State Board of Health shall demonstrate its necessity;

4th. That the village council, by purchase or otherwise, control all property within 500 feet of any well and prevent the establishment of any source of pollution within that distance; and,

5th. That this approval shall be void unless detailed plans for the development of the supply, and the results of tests for quantity, shall have been submitted to the State Board of Health prior to April 1st, 1913.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Sutton.

In the negative, none.

The Secretary was instructed to advise the village authorities that they should employ an engineer experienced in water works design to superintend the tests and furnish the design for the proposed installation, and to state that while the quality of the proposed new supply is satisfactory from a sanitary standpoint, the mineral characteristics are objectionable.

On motion of Dr. Warner, seconded by Dr. Grube, the plans for proposed additional sewerage for Sewer District No. 13, Sandusky, and revised plans for proposed additional sewerage for Mill Creek District,

Sandusky, submitted by Mr. R. L. J. Wagar, city engineer, on October 15th and October 21st, 1912, respectively, were approved subject to the following conditions:

1st. That prior to the construction of the sewers in either district, the city present to the State Board of Health a design and estimate of cost for extension of the water works intake to a suitable location in Lake Erie; and,

2nd. That plans satisfactory to the State Board of Health for the extension of the waterworks intake be submitted to said Board prior to January 1st, 1913.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Sutton.

In the negative, none.

The Secretary was instructed to advise the authorities as follows: In granting conditional approval of the proposed additional sewers the promotion of sanitary conditions within the districts to be served is considered, but the intimate relationship between the discharge of sewage into Sandusky Bay and the water supply of the city must not be disregarded.

It is realized that Sandusky Bay is and must remain the receptacle for not only the sewage of the city, raw or treated, but also the receptacle of a large amount of pollution from vessels, industries along the shore, etc. Under these conditions the water in the bay is unfit for use as a public water supply and is of such character that a dangerous burden is placed upon the plant provided to purify the supply. Immediate steps should be taken to remove the water works intake from the bay.

At some time in the future treatment of the sewage from the city will be required and this will necessitate the collection of the flow to proper points for treatment. It is, however, impracticable to purify the sewage to an extent which will safeguard the water supply in its present condition, especially when the pollution reaching the bay from vessels and other sources is considered.

The first and immediate step should, therefore, be to secure an extension of the intake, and it cannot be considered a proper sanitary procedure to construct additional sewers until such extension is made.

On motion of Dr. Sutton, seconded by Mr. Hartzell, the plans for a proposed sanitary sewer and sedimentation tank for The Toledo Glass Company, Toledo, submitted by The De Vore-McGormley Company, engineers for said company, September 9th, 1912, were approved subject to the following conditions:

1st. That the tank be abandoned and removed when connection to the city sewers shall have become available;

2nd. That the tank be located on the line of the sewer at least 50 feet above the point shown on the plans;

3rd. That the outfall sewer extending from the tank to the outlet be provided with at least two manholes and be constructed in straight lines between manholes;

4th. That the outlets be constructed of cast iron pipe, submerged below low water of the stream;

5th. That no discharge of sludge be permitted to reach the stream receiving the effluent; and,

6th. That this approval shall be void unless the proposed sewer and sedimentation tank shall have been constructed prior to July 1st, 1913.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Sutton.

In the negative, none.

On motion of Mr. Hartzell, seconded by Dr. Warner, the plans for the proposed water purification plant for The Provident Coal Company and the community of Provident, near St. Clairsville, and submitted September 10th, 1912, by The J. W. Frazier Company, engineers for said company, were approved subject to the following conditions:

1st. That samples of the filtering material be submitted to and approved by the engineer of the State Board of Health before the material is placed;

2nd. That The Provident Coal Company employ an operator, whose duties shall include only the operation of the water purification plant and the general care of the water supply;

3rd. That accurate records of operation, including the quantity of the water filtered, be maintained and furnished to the State Board of Health at monthly intervals;

4th. That the coagulation basin be increased in size to provide a capacity of at least 12,500 gallons or a three-hour period of flow;

5th. That the method of applying the coagulant be changed if deemed necessary by the State Board of Health;

6th. That the water purification plant be installed before water for the proposed supply is furnished for domestic use; and,

7th. That this approval shall be void unless the proposed water purification plant shall have been installed prior to July 1st, 1913.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Sutton.

In the negative, none.

On motion of Dr. Sutton, seconded by Dr. Grube, the plans for a proposed joint storm sewer for the Lake Shore and Michigan Southern Railway Company and Toledo Heights, submitted September 3rd, 1912, by John R. Cowell, director of public service of Toledo, were approved subject to the following conditions:

1st. That the council of the city of Toledo pass an ordinance, satisfactory to the State Board of Health, defining the use of the sewer;

the said ordinance to prevent the use of the main sewer or any future laterals to receive sewage or other wastes; and.

2nd. That this approval shall be void unless the said ordinance shall have been passed and a certified copy filed with the Secretary of the State Board of Health prior to December 1st, 1912.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Sutton.

In the negative, none.

The Board then took up for consideration the report of the committee, the Secretary and the chief engineer, appointed to consider the various Bense propositions, and on motion of Mr. Hill, seconded by Dr. Sutton, the report and recommendations were approved.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Sutton.

In the negative, none.

The first recommendation was that a date be fixed before which improvements shall be made, and orders be prepared and transmitted to the Governor and the Attorney General for their approval, to Marysville in regard to sewerage and sewage purification; Lima in regard to the pollution of the water supply by wastes from the Allen County Infirmary; and Plymouth in regard to a satisfactory water supply.

A communication from the village solicitor of Marysville, Mr. J. H. Kinkade, stating that the village would proceed as rapidly as possible to carry out the Board's order issued under date of February 24th, 1911, was read by the Secretary, and he recommended that action at this time be deferred, but if upon investigation it should be found that the village was not proceeding as rapidly as they should further proceedings be taken.

It was therefore decided to take no further action at this time relative to Marysville, or Lima, as the question of the wastes from the Allen County Infirmary was disposed of earlier in this meeting; the order to the Plymouth authorities to be transmitted to the Governor and the Attorney General for their action thereon.

The second recommendation was that the authorities of Fostoria, Defiance and Lima be cited to appear before the Board at its next regular meeting; the Fostoria authorities to show cause, if any, why the city should not be required to enlarge and remodel the existing sewage purification works in a manner satisfactory to the State Board of Health; the Defiance authorities to be present to confer with the Board regarding the present condition of the water supply of that city, with a view to reaching a settlement as to its improvement.

As Lima is now proceeding under two Bense actions relative to their water supply it was deemed advisable to postpone action in regard to sewerage until a later time.

The third recommendation was that all other Bense cases be referred to the chief engineer for investigation and report upon present conditions.

Mr. Hill presented a report upon a request from The Reif-Schoening Tanning Company to discharge the waste water from their tannery into the east fork of Mill Creek, and recommended that permission be granted provided the company file with the chief engineer of the State Board of Health a complete description of the method to be pursued in the recovery of grease and oils from the scraped hides, after they have been taken from the salt water bath, showing the percentage of total grease removed from the hides which the company expects to recover, and develop their method of recovering the grease and oils in such a manner as will ensure the least possible amount of grease, etcetera, going into the creek with the waste water from the tannery.

On motion of Dr. Warner, seconded by Dr. Grube, the report and recommendation were approved.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Sutton.

In the negative, none.

Mr. Hill discussed the question of water supply for passengers and trainmen on railroads operated in Ohio, the matter coming up on request from two railroad systems for laboratory examination of all sources of water supply used by their passengers and trainmen.

On motion of Mr. Hill, seconded by Dr. Warner, the Secretary was instructed to notify these applicants that it would be impossible with the present laboratory equipment to offer to examine waters for all railroads in the state, and further to make inquiry of all railroads in the state as to the source of water supply used in both passenger and freight service, and to take such steps as may be necessary to prevent the use of impure water supplies.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Sutton.

In the negative, none.

Dr. Sutton made a statement in regard to plans for improvement in the water supply of Zanesville; said plans now being under consideration by the city council. As there is some urgency for early action, Dr. Sutton requested that a special meeting of the Board be held for action on the plans.

On motion of Dr. Warner, seconded by Mr. Hill, it was voted to hold a special meeting of the Board in Cincinnati, November 5th, 1912.

The Secretary presented the amended rules and regulations for the transportation of the dead, recommended by the Conference of State and Provincial Boards of Health of North America, and adopted by the Conference at its meeting held in Washington, D. C., in September.

He was instructed to send a copy of these rules and regulations to each member of the Board for action at the next meeting.

The Secretary presented a list of health officers, appointed by their respective councils to serve in lieu of a board of health.

On motion of Mr. Hill, seconded by Dr. Sutton, these health officers were approved.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Sutton.

In the negative, none.

On motion of Mr. Hill, seconded by Dr. Warner, it was voted to renew the licenses of the following applicants to conduct maternity boarding houses and lying-in hospitals.

Mrs. John Kratz, 399 East Market Street, Akron, providing for the keeping of four women or eight children.

Mrs. Anna Lienesch, 2703 Colerain Avenue, Cincinnati, providing for keeping two children.

Mrs. Zella Briggaman, 1432 East Rich Street, Columbus, providing for the keeping of ten women and ten children.

Miss Evangeline Reams, 73 North Harris Avenue, Columbus, providing for the keeping of ten women and ten children.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Sutton.

In the negative, none.

The Secretary presented a communication from the State Inspector of Plumbing in regard to the work of his department and the necessity that some arrangement be made to care for the large amount of work to be done. The matter of completing the parts of the State Building Code relating to sanitation was also presented.

On motion of Dr. Warner, seconded by Dr. Sutton, it was voted to refer these matters to a special committee, consisting of the Secretary and the State Inspector of Plumbing, for report at the special meeting.

The Secretary presented the resignation of Miss Hazel Cameron, a member of the laboratory staff; and made a statement in regard to investigations being made in the laboratory in which work he is receiving valuable assistance from the Department of Zoology of Ohio State University.

On motion of Dr. Warner, seconded by Dr. Sutton, the Secretary was instructed to tender the thanks of the Board to the president of Ohio State University, Dr. W. O. Thompson, and to Professor Herbert Osborn of the Department of Zoology.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Sutton.

In the negative, none.

The Secretary presented a petition from the trustees of Berne Township, Fairfield County, complaining of the contamination of the Hocking River by the wastes from the Leather Board Works at Lancaster, and asking the Board to investigate the conditions complained of.

On motion of Mr. Hill, seconded by Dr. Grube, this complaint was referred to the Engineering Department for investigation and report.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Sutton.

In the negative, none.

On motion of Mr. Hill, seconded by Dr. Grube, it was voted to hold the next regular meeting in Cincinnati, at 8 P. M., November 21st, 1912.

Those voting in the affirmative were Messrs. Warner, Hasencamp, Hartzell, Grube, Hill and Sutton.

In the negative, none.

On motion of Mr. Hill, seconded by Dr. Grube, the Board adjourned.

Attest.

E. F. McCAMPBELL,
Secretary.

Approved November 21st, 1912.

NOVEMBER 5th, SPECIAL MEETING

A special meeting of the State Board of Health was held at the Havlin Hotel, Cincinnati November 5th, 1912, at 4:45 p. m., to consider the proposed new water supply for the city of Zanesville; and the recommendations of the State Inspector of Plumbing.

The members present were Drs. Hasencamp, Hartzell, Grube, Sutton, Warner and Mr. Hill.

Upon request of Mr. Hill, Engineering Committee of the Board, the Secretary read the summary and recommendations of the chief engineer in regard to the proposed new water supply for Zanesville. These recommendations were as follows:

That a proposed new supply for Zanesville to be obtained from drilled wells on the Hague Farm, situated east of the Muskingum River and immediately north of the city, and to be developed according to plans prepared by Messrs. Hering and Gregory of New York City, consulting engineers for the city, and submitted to the State Board of Health October 29th, 1912, be approved subject to the following conditions:

1st. That the city council pass an ordinance and file a certified copy of the same with the State Board of Health, preventing the establishment of any privy vault, cesspool or other source of pollution within 500 feet of any of the wells; said ordinance to be approved by the Secretary of the State Board of Health before its passage.

2nd. That the State Board of Health be furnished with the results of tests for quantity of the proposed supply, provided in the consulting engineers' specifications, before contracts for the installation of the pumping station and machinery shall have been awarded.

3rd. That the design of the overflow from the clear water reservoir be revised by providing a gate valve in addition to the flap valve shown on the plans.

4th. That, immediately following the installation of the proposed new supply, the existing water supply and pumping station be entirely abandoned and disconnected from the distribution system; or, that, if the existing installation be maintained as an emergency supply, its use be subject to the control of the health officer of the city of Zanesville, and that the city council pass an ordinance and file a certified copy of the same with the Secretary of the State Board of Health containing the following provisions:

(a) Authorizing and ordering the director of public service to provide the local health officer with equipment for placing seals upon

the valves in the mains connecting the existing pumping station with the distribution system;

(b) Authorizing and directing the local health officer to place seals upon the said valves in such manner that the valves cannot be opened without breaking and destroying the said seals:

(c) Ordering the director of public service or the superintendent of water works to notify the local health officer of the opening of said valves before the valves are opened, if possible, and in any case within one hour after the valves are opened; and directing the local health officer to give general warning to boil all water used for drinking to the inhabitants of the city, immediately upon receiving such notification, and to place a seal upon the valves immediately following the termination of the use of the emergency supply; and,

(d) Directing the local health officer to inspect said seals at intervals not greater than thirty days to determine whether they have been broken without his knowledge.

5th. That this approval shall be void unless contracts for the installation of the proposed new supply shall have been awarded prior to March 1st, 1913.

The consulting engineers should be advised that in the opinion of the State Board of Health (1) the design of the overflow from the clear water reservoir should include a gate valve in order to prevent back flow into the reservoir during extreme high stages of the Muskingum River, and (2) that a drain should be provided from the clear water reservoir to make possible the removal of iron deposits and other material which may accumulate at the bottom of the reservoir.

The officials of the city of Zanesville should be advised as follows: The quality of the proposed new supply to be obtained from wells has been shown to be entirely satisfactory from a hygienic standpoint. Its mineral constituents, are, however, objectionable, particularly as regards the hardness and iron. The hardness of the well water is considerably greater than that of the Muskingum River, and it may be anticipated that considerable complaint will arise from the consumers. The permanency of the supply as regards its quantity is not assured and can be indicated but not proven by pumping tests.

The proposition was quite thoroughly discussed by Dr. Warner, who called attention to the necessity of an adequate and proper supply for Zanesville, dealing with the efficiency of a well supply or filtration of water from the Muskingum River.

Dr. Sutton spoke on the matter and called the attention of the Board to the fact that the proposed plans of the consulting engineers, Messrs. Hering and Gregory, provide for the adoption of a filtration system in case the well supply should prove inadequate.

Mr. Hill then offered the report of the Engineering Committee on this project and made the following motion, which was seconded by Dr. Sutton:

"That the plans of Messrs. Hering and Gregory, consulting engineers, for a proposed new water supply for the city of Zanesville, be and are hereby approved with respect to the Hague Farm as a proposed source of supply, provided the directions given Mr. Gregory by the State Board of Health at its meeting held at the Hotel Sinton, Cincinnati, August 15th, 1912, with respect to proper testing out of this source of supply, before contracts are made for anything beyond the necessary test and observation wells, be thoroughly exploited; and, further, that this approval shall not go beyond the approval of the Hague Farm as a proposed source of supply and such experimental work as may be required to prove that it is a sufficient source in point of quantity, and shall not be held to include the plans for pumping station, pumping machinery and other features of the work embraced in the plans submitted; the approval to be granted in accordance with the recommendations of the chief engineer submitted at this meeting."

Those voting in the affirmative were Messrs. Hasencamp, Hartzell, Grube, Hill, Sutton and Warner.

In the negative, none.

It was moved by Dr. Warner and seconded by Mr. Hill to approve that part of the recommendation of the State Inspector of Plumbing relating to the recommendation of the State Board of Health that the local boards of health in the following cities be requested to appoint a plumbing inspector and, when necessary, establish a fee system in order to make the office self-sustaining: Barberton, Bellaire, Bellefontaine, Bucyrus, Chillicothe, Conneaut, Delaware, East Liverpool, Elyria, Findley, Fostoria, Hamilton, Ironton, Lancaster, Lima, Mansfield, Marietta, Marion, Martins Ferry, Middletown, Mt. Vernon, Newark, New Philadelphia, Niles, Piqua, Salem, Steubenville, Tiffin, Xenia and Zanesville.

Those voting in the affirmative were Messrs. Hasencamp, Hartzell, Grube, Hill, Sutton and Warner.

In the negative, none.

It was moved by Mr. Hill and seconded by Dr. Grube to reject that part of the State Inspector's report asking the State Board of Health to go before the Emergency Board to secure funds for the payment of salaries to additional inspectors; and to direct the State Inspector of Plumbing to devote as much of his time as is necessary in the immediate future to the satisfactory compilation of that part of the State Building Code relating to plumbing work.

Those voting in the affirmative were Messrs. Hasencamp, Hartzell, Grube, Hill, Sutton and Warner.

In the negative, none.

The Board then adjourned.

Attest:

E. F. McCAMPBELL,

Secretary.

Approved November 21st, 1912.

NOVEMBER MEETING

1912

The regular monthly meeting of the State Board of Health was held at the Hotel Statler, Cleveland, November 21st, 1912.

There were present Messrs. Hasencamp, Grube, Sutton, Miller, Warner and Hartzell.

The meeting was called to order by President Hasencamp at 8 p. m.

Mr. John N. Stockwell, assistant city solicitor, representing the city of Cleveland, asked the Board to reaffirm its action of June 28th, 1912, approving the location of a sewage disposal plant south of the city and east of the Cuyahoga River. A request for such action was also received from W. J. Springborn, director of public service.

On motion of Dr. Miller, seconded by Dr. Grube, it was voted to reaffirm this action.

Those voting in the affirmative were Messrs. Hasencamp, Grube, Sutton, Miller, Warner and Hartzell.

In the negative, none.

In answer to a request to the city of Defiance and The Defiance Water Company for a conference regarding the present condition of the water supply of that city, with a view to reaching a settlement as to its improvement, there appeared W. A. Schmaltz, mayor, and Tullis T. Shaw, city solicitor, representing the city and W. J. McGonigale, receiver, and Robert Newbegin, attorney, representing the water company.

Mr. Newbegin gave the history of the water company since its beginning, as to financial management and operation. He stated that he believed the Maumee River water to be suitable for a public supply, but if improvements could be made the company was willing to meet the Board in a friendly way to consider these improvements. He also gave a history of litigation with the city concerning the supply.

Mr. Dittoe gave the results of several investigations that have been made on the condition of the Maumee River as a source of water supply and stated that analytical data show evidence of pollution of the public water supply at Defiance.

Mr. Shaw made a statement as to the city's side in the controversy with the water company. He stated that the supply had never been of suitable character and this was the primary cause of the suit. He referred to the court record of evidence taken in the hearing of the suit to bear out his statements.

Then ensued a controversy between the attorneys as to the condition of the supply.

On motion of Dr. Grube, seconded by Dr. Sutton, it was voted to refer the matter to the Engineering Department for further investigation.

Those voting in the affirmative were Messrs. Hasencamp, Grube, Sutton, Miller, Warner and Hartzell.

In the negative, none.

Mr. O. R. Wade, city solicitor, and Charles Latshaw, city engineer, of Fostoria, appeared in response to a citation to appear before the Board to show cause why the city should not enlarge and remodel its sewage purification works so as to prevent further pollution of a stream.

Mr. Wade stated that present conditions had been caused by neglect, and thought if the plant were properly operated good results could be secured. Mr. Latshaw stated that the plant did not and never had received all the sewage; that the present council was not opposed to making improvements but would request that the degree of purification be not made too high.

The matter was referred to executive session.

Mr. W. J. Doran, chairman of the sewer committee, J. G. Brown, councilman, C. J. Ford, village solicitor, and W. H. Brown, health officer, of Geneva, appeared in response to a citation to show cause why the village should not reconstruct its sewage disposal plant so as to properly care for the sewage of the village, and also to make explanation concerning the method of disposing of garbage and other refuse.

Mr. Ford stated that the plant was now in good working order, as testified by the superintendent in charge of the plant, and that the financial condition of the village was such as to preclude other improvements at present. He asked that the Board allow at least a year's time within which to make improvements if such were deemed necessary.

The matter was referred to executive session.

The health officer stated that a suitable place had been found for disposing of garbage and that there would be no further cause for complaint.

Mr. George A. Meekison, village solicitor for Napoleon, was present in answer to a request to show what steps could be taken to improve the public water supply. Mr. Meekison stated that plans for sewerage had been amended as required by the Board and submitted amended plans in accordance with condition 4, of the Board's approval of September 12th, 1912. He further stated that investigation of the Haley Avenue sewer did not disclose any connections for house wastes. He said that the village authorities would take up the question of purification of the water supply as soon as this was found necessary.

The matter was referred to executive session.

In executive session:

It was moved by Dr. Warner and seconded by Dr. Miller to approve the minutes of the October 23rd, 1912, meeting.

Those voting in the affirmative were Messrs. Hasencamp, Grube, Sutton, Miller, Warner and Hartzell.

In the negative, none.

It was moved by Dr. Grube and seconded by Dr. Sutton to approve the minutes of the November 5th, 1912, special meeting.

Those voting in the affirmative were Messrs. Hasencamp, Grube, Sutton, Miller, Warner and Hartzell.

In the negative, none.

(In letter of Nov. 21, Mr. Hill voted "aye.")

It was moved by Dr. Miller and seconded by Dr. Sutton to approve the monthly report of the Secretary.

Those voting in the affirmative were Messrs. Hasencamp, Grube, Sutton, Miller, Warner and Hartzell.

In the negative, none.

(In letter of Nov. 21, Mr. Hill voted "aye.")

The Secretary made a statement relative to conferences with the Ohio Society for the Prevention of Tuberculosis and with the Council on Public Health and Legislation of the Ohio State Medical Association on the question of an appropriation for the establishment of a Division of Tuberculosis in the State health department. He also spoke of the necessity of an appropriation for the study of occupational diseases as required by a joint resolution of the 79th General Assembly.

It was moved by Dr. Sutton and seconded by Dr. Miller to authorize the Secretary to place in the budget for 1913 and 1914 a request for an appropriation of \$50,000 for tuberculosis work, and an appropriation of \$6,000 for the study of occupational diseases.

Those voting in the affirmative were Messrs. Hasencamp, Grube, Sutton, Miller, Warner and Hartzell.

In the negative, none.

It was moved by Dr. Grube, and seconded by Dr. Warner to approve the report of the Finance Committee; this being a statement of expenditures from October 31st to and including November 15th, 1912; and a statement of balances available on November 16th, 1912.

Those voting in the affirmative were Messrs. Hasencamp, Grube, Sutton, Miller, Warner and Hartzell.

In the negative, none.

(In a letter of Nov. 21, Mr. Hill voted 'aye.')

Dr. Warner, chairman, offered the following report of the Executive Committee:

To the State Board of Health.

GENTLEMEN:—Your Executive Committee begs to submit the following recommendations:

1. It is recommended that Vol. 1 of The Rand-McNally Company Library Atlas of the World be purchased for use in the Engineering Department, at a cost of..... \$12 50
2. It is recommended that there be purchased
 20 rugs 27" by 54", at \$4.50 each..... 90 00
 35 yards of rubber matting, at \$1.70 per yd..... 54 50

Respectfully submitted,

FRANK WARNER, *Chairman.*

Dr. Warner also made a verbal report of visits to the office to consult with the Secretary regarding disposal of infected rags, condition of railroad eating houses, and the distribution of antitoxin.

It was moved by Dr. Miller and seconded by Dr. Sutton to approve the report and recommendations of the chairman of the Executive Committee.

Those voting in the affirmative were Messrs. Hasencamp, Grube, Sutton, Miller, Warner and Hartzell.

In the negative, none.

In the absence of Mr. Hill, the Secretary read the report of the Engineering Committee and the matters were taken up in the following order:

It was moved by Dr. Warner and seconded by Dr. Sutton to approve the plans and specifications for a proposed county storm water sewer at Forest, submitted by Mr. L. R. Anspach, county surveyor of Hardin County, October 9th, 1912, subject to the following conditions:

1st. That the proposed sewer and future laterals to the same shall be used for the removal of surface water only, and that in the construction of the sewer and future laterals no Y branches for house connections shall be placed:

2nd. That the council of the village of Forest pass an ordinance restricting the use of the sewer by prohibiting connections for closet wastes, sink drainage, household wastes of all kinds, and cesspool overflow, said ordinance to be approved by the Secretary of the State Board of Health before its passage;

3rd. That no additional laterals to the proposed sewer shall be constructed until plans and specifications for the same shall have been submitted to and approved by the State Board of Health; and

4th. That this approval shall be void after June 1st, 1913, unless construction of the proposed sewer shall have been commenced prior to that date.

Those voting in the affirmative were Messrs. Hasencamp, Grube, Sutton, Miller, Warner and Hartzell.

In the negative, none.

It was moved by Dr. Sutton and seconded by Dr. Warner to approve the plans and specifications for the development of the proposed additional water supply for Chagrin Falls, submitted by The Wm. H. Evers Engineering Company of Cleveland, engineers for the village, on November 13th, 1912, the general plans for which were conditionally approved by this Board May 9th, 1912, subject to the following conditions:

1st. That no connection to the springs or gravity conduit line be installed whereby the water from Spring Brook may be admitted to the springs or conduit line; and,

2nd. That springs Nos. 1 and 4 be abandoned if at any time the State Board of Health shall find that water from Spring Brook is contaminating the supply.

Those voting in the affirmative were Messrs. Hasencamp, Grube, Sutton, Miller, Warner and Hartzell.

In the negative, none.

It was moved by Dr. Sutton and seconded by Dr. Warner to grant the request of Mr. Charles H. Krantz, director of public service of Canal Dover, of November 12th, 1912, for an extension of the time limit for the submission of plans for sewage purification provided in the approval of proposed sanitary sewers for District No. 3, given August 15th, 1912, and to revise the said approval to read as follows: That the plans for proposed sewerage for District No. 3 be approved provided plans for sewage purification be presented to the State Board of Health for approval prior to January 15th, 1913.

Those voting in the affirmative were Messrs. Hasencamp, Grube, Sutton, Miller, Warner and Hartzell.

In the negative, none.

It was moved by Dr. Sutton and seconded by Dr. Warner to approve the plans for proposed sewerage and sewage purification for the Miles-Corlett Allotment of The Caine Realty Company at Cleveland, submitted by Mr. R. Winthrop Pratt, consulting engineer, November 16th, 1912, subject to the following conditions:

1st. That a sludge filter, satisfactory to the engineer of the State Board of Health, be provided for the drying of the sludge removed from the tank;

2nd. That samples of the filtering material be submitted to and approved by the engineer of the State Board of Health before it is placed;

3rd. That The Caine Realty Company employ a caretaker to visit the plant at least twice each week and attend to its proper operation;

4th. That the entire plant be abandoned and removed as soon as sanitary sewers for the district shall have been constructed by the city of Cleveland; and,

5th. That this approval shall be considered void unless the proposed sewerage and sewage purification plant shall have been constructed prior to June 1st, 1913.

Those voting in the affirmative were Messrs. Hasencamp, Grube, Sutton, Miller, Warner and Hartzell.

In the negative, none.

The Secretary presented a request, received from the director of public service of Sandusky, Mr. John Bing, for an extension of the time limit for the submission of plans and estimate of cost for the extension of the water works intake, provided in the Board's approval of proposed additional sewerage for Sandusky given October 23rd, 1912.

It was moved by Mr. Hartzell and seconded by Dr. Grube to grant this request, and to revise the second condition of the said approval to read as follows:

"That plans satisfactory to the State Board of Health for the extension of the water works intake and an estimate of cost of the same, be submitted to the State Board of Health prior to March 1st, 1913."

Those voting in the affirmative were Messrs. Hasencamp, Grube, Sutton, Miller, Warner and Hartzell.

In the negative, none.

The Secretary was instructed to advise the authorities of Sandusky that in granting this request for extension of time, the Board does not sanction the construction of the proposed additional sewers until plans and estimate of cost for the extension of the water works intake, satisfactory to the Board, have been submitted; that it is not to be construed that the installation of sewers for District No. 13, or for the Mills Creek District, can be begun prior to the submission of said plans and estimate of cost to the State Board of Health.

The Secretary presented the following orders, adopted by the health officer of Logan, Mr. J. H. Carnes, serving in lieu of a board of health:

Order No. 1. Prohibiting the deposit of rubbish, weeds, grass and other obnoxious substances upon the streets, alleys, lanes, avenues and other public thoroughfares in the village of Logan, Ohio.

Order No. 2. Providing for the cutting of weeds and noxious vegetation and otherwise cleaning of lots and lands in the village of Logan, Ohio.

It was moved by Dr. Warner and seconded by Dr. Miller to approve these orders.

Those voting in the affirmative were Messrs. Hasencamp, Grube, Sutton, Miller, Warner and Hartzell.

In the negative, none.

The Secretary presented the names of the following health officers, appointed to serve in lieu of a board of health:

Wm. C. L. Hall, New Straitsville, until 1913.

Earl M. Warner, Morral, until 1913.

It was moved by Mr. Hartzell and seconded by Dr. Sutton to approve the first named health officer, he having been approved by the president of the Perry County Medical Society; and to approve the second upon the condition that the president of the Preble County Medical Society endorses the appointment.

Those voting in the affirmative were Messrs. Hasencamp, Grube, Sutton, Miller, Warner and Hartzell.

In the negative, none.

The Secretary presented a summary of the report of the State Inspector of Plumbing, with a statement of receipts and deposits with the State Treasurer.

It was moved by Dr. Grube and seconded by Mr. Hartzell to adopt the report and file the same.

Those voting in the affirmative were Messrs. Hasencamp, Grube, Sutton, Miller, Warner and Hartzell.

In the negative, none.

The Secretary presented an invitation from Mr. James O. Gibson of Cincinnati, asking the Board to visit the exhibit of the Standard Sanitary Manufacturing Company of Pittsburg, at the time of the next meeting of the Board in Cincinnati.

It was moved by Dr. Grube and seconded by Dr. Sutton to thank Mr. Gibson for the invitation, and to take advantage of the offer if possible.

The Secretary presented the following amended rules in regard to the transportation of dead bodies, adopted by the Conference of State and Provincial Boards of Health of North America at its meeting in Washington, D. C., September 20th and 21st, 1912:

RULE 1. A shipping permit and paster issued by the proper local health authorities shall be required for all dead bodies shipped by common carrier. The paster shall accompany the corpse and be attached to the shipping case. The shipping permit shall contain the name, sex, color and age of the deceased, the cause, and the date of death, the shipping point, the destination, the date and route of shipment and a statement as to the method of preparation of the body and the construction of the coffin, casket or shipping case, the date of issuance, and the signature and official title of the officer issuing the permit. The paster shall contain the place and date of death, the name of the deceased, the point of destination, the name and address of the shipping undertaker, the date of issuance and the signature and official title of the officer issuing the permit.

RULE 2. The transportation of bodies dead of smallpox, plague, Asiatic cholera, yellow fever, relapsing fever, typhus fever, typhoid fever, diphtheria, membranous croup, diphtheritic sore throat, scarlet fever, scarlet rash, erysipelas, glanders, anthrax, tetanus, leprosy, cerebro spinal fever, epidemic anterior poliomyelitis, or Rocky Mountain spotted fever, from one state, territory, district or province to another, shall be permitted only under the following conditions: The body shall be thoroughly embalmed with an approved disinfectant fluid, all ori-

nices shall be closed with absorbent cotton, the body shall be washed with the disinfectant fluid and enveloped in a sheet saturated with the same and placed at once in the coffin or casket which shall be immediately closed (and the coffin or casket or the outside case containing the same shall be metal or metal lined and hermetically and permanently sealed.)

RULE 3. The transportation of bodies dead of any disease other than those mentioned in Rule 2 shall be permitted under the following conditions:

(a) When the destination can be reached within twenty-four hours after death, or when the body has been embalmed with an approved disinfectant, the coffin or casket shall be encased in a strong outer box made of good sound lumber not less than seven-eighths of an inch thick, all joints must be ploughed and grooved, top and bottom put on with cleats and cross-pieces, all put securely together, to be tightly closed with white lead, asphalt, varnish, or paraffin paint and a rubber band placed on the upper edge between the lid and box.

(b) When the body is not embalmed and the destination cannot be reached within twenty-four hours after death, the coffin, casket or outside case containing the same shall be metal or metal lined and hermetically sealed.

RULE 4. Every disinterred body, dead from any disease or cause shall not be accepted for transportation unless said removal has been approved by the state, territory, district or provincial health authorities having jurisdiction where such body is disinterred; and such disinterred remains, or the coffin or casket containing the same, must be wrapped in a woolen blanket thoroughly saturated with a 1-1000 solution of corrosive sublimate, and enclosed in a hermetically soldered zinc, tin or copper-lined box. But bodies deposited in receiving vaults shall not be treated and considered the same as buried bodies when originally prepared by a licensed embalmer as defined in Rule 3, provided shipment takes place within thirty days from the time of death. The shipment of bodies prepared in the manner above directed by licensed embalmers from receiving vaults may be made within thirty days from the time of death without having to obtain permission from the health authorities of the locality to which the body is consigned. After thirty days the casket or coffin containing said body must be enclosed in a hermetically soldered box. Every outside shipping case shall contain not less than four handles.

RULE 5. An approved disinfectant fluid shall contain not less than 5 percent of formaldehyde gas, and the amount injected should not be less than 10 percent of the body weight, injected arterially in addition to cavity injection.

It was moved by Dr. Grube and seconded by Dr. Sutton to adopt these rules and to instruct the Secretary to have them printed and distributed to all those whose duties or business bring them in contact with the preparation of dead bodies for shipment.

Those voting in the affirmative were Messrs. Hasencamp, Grube, Sutton, Miller, Warner and Hartzell.

In the negative, none.

Dr. Grube presented the report of the committee on revision of the by-laws and moved the adoption of the report. The motion was seconded by Mr. Hartzell.

Dr. Sutton moved to amend by striking out of Section 12 the paragraph providing for an Executive Committee, and to amend Section 13 by substituting the words "President and Secretary" for the words "Executive Committee."

Dr. Grube, with the consent of Mr. Hartzell, accepted the amendment.

The motion to adopt the report as amended was then put and carried.

Those voting in the affirmative were Messrs. Hasencamp, Grube, Sutton, Miller, Warner and Hartzell.

In the negative, none.

(In a letter to the Secretary under date of November 21, 1912, Mr. Hill asked to have his vote recorded in favor of the report as originally submitted. Secretary.)

The Rules and By-Laws as adopted are as follows:

RULES AND BY-LAWS OHIO STATE BOARD OF HEALTH.

PREAMBLE.

Under and in pursuance of authority granted in Section 1233, General Code of Ohio, the following rules and by-laws are adopted by the Ohio State Board of Health.

ORGANIZATION.

SECTION 1. The officers of the State Board of Health shall be a President and Vice-President who shall be nominated and elected at the regular meeting of the Board in the month of November each year and said officers shall assume their duties at the regular meeting in the following December.

SECTION 2. It shall be the duty of the President to preside at all meetings of the Board and to perform such other duties as are required by law or by custom and parliamentary usage.

SECTION 3. In the absence of the President, the Vice-President shall perform the duties of the President.

SECTION 4. In the absence of both President and Vice-President from a meeting of the Board, the members present if there be a quorum present, shall elect a presiding officer for that meeting.

MEETINGS.

SECTION 5. The Board shall hold a regular meeting each month and when necessity demands may hold special meetings. Regular meetings shall be held on the third Thursday of the month with the exception of the meeting in December which shall be held on or before the thirteenth day of the month. The time and place for holding a regular meeting shall be fixed at a preceding regular meeting, but the time and place may be changed by the President at request of three members of the Board; provided, however, that the regular meeting in January of each year must be held in Columbus as required by law.

SECTION 6. A special meeting may be arranged for at a regular meeting or may be called by the Secretary on the order of the President, or by four members of the Board. In arranging for, or in making a call for, a special meeting, the matters to be considered at such meeting must be definitely stated and no other business shall be considered except with the unanimous consent of a majority of the Board.

SECTION 7. Five members shall constitute a quorum for the transaction of business as provided by law.

EMPLOYEES.

SECTION 8. The Secretary shall be executive officer of the Board and shall do and perform such duties as are prescribed by the Board or by law. He shall be elected and hold his office in accordance with the provisions of law. The Secretary shall be the custodian of all properties belonging to the Board and shall be responsible to the Board for the safe keeping and condition of such property. The Secretary shall edit the Monthly Bulletin and other publications of the Board and shall have charge of all administrative matters.

SECTION 9. Such other employees may be appointed from time to time as the work of the Board demands and the appropriations made by legislature will permit; such appointments shall be made by the Board on the recommendation of the Secretary and such appointees shall perform such duties as may be fixed by the Board or by the Secretary. When it may become necessary to temporarily employ additional help, the President, upon the request of the Secretary, may authorize such employment. All employees of the Board shall be under the direct control of the Secretary and shall be responsible to him for the proper performance of their respective duties.

SECTION 10. In making a recommendation for appointment the Secretary shall be governed by the merits of the applicant for the position to be filled. No applicant shall be recommended or appointed on account of his political belief, and no employee of the Board will be permitted to engage actively in behalf of any candidate for political office.

SECTION 11. In case of the absence or disability of the Secretary, his duties shall be performed by the Assistant Secretary.

COMMITTEES.

SECTION 12. There shall be the following standing committees:

1. The finance committee, consisting of three members of the Board selected by the President.

2. The engineering committee, consisting of one member of the Board appointed by the President.

3. The committee on conference, consisting of the President, Secretary, and one member of the Board appointed by the President for a time to be specified by the President.

The term of office as a member of a standing committee shall be one year except in case of the member appointed on the committee on conferences.

SECTION 13. The President and Secretary shall have charge of the affairs of the Board in the interim between regular meetings and shall be authorized to act for the Board in any matter requiring immediate action. When action is taken by the President and Secretary a report shall be made at the next regular meeting of the Board.

SECTION 14. It shall be the duty of the finance committee to supervise the financial affairs of the Board and to make a monthly report of all expenditures during the preceding month and also a statement of purchases recommended. All bills shall be submitted to and approved by the chairman of the committee before being submitted in the form of a voucher to the President, and no purchase except for necessary office and laboratory expenses shall be made unless the approval of the committee is first secured. Any unusual expenditures that must be incurred between meetings of the Board must be approved by the President and chairman of the finance committee and be reported to the Board at its next regular meeting with a proper explanation.

SECTION 15. It shall be the duty of the engineering committee to review all matters of an engineering nature to be acted upon by the Board and to make recommendations to the Board as to the action to be taken.

SECTION 16. It shall be the duty of the committee on conferences to arrange the time, place and program for such conferences with local boards of health as may be called by the Board.

SECTION 17. Such special committees may be appointed as the Board may find necessary. Unless otherwise provided, appointments on such committees shall be made by the President. All special committees will be continued until discharged by the Board or by the President. Where a special committee is discharged by the President, the Board shall be duly notified.

REPORTS.

SECTION 18. It shall be the duty of the Secretary to make a monthly report of the work of the different departments including in such reports a resume of investigations made that are not reported upon for action by the Board, and such other information as will be of interest. He shall also make to the finance committee a monthly report of expenditures, balances, and other matters affecting the finances of the Board. He shall make such other reports or furnish such information as may be requested by the Board or by a special or standing committee.

SECTION 19. Where a representative is sent by the Board, at the expense of the State, to attend a conference or meeting of any kind, a report shall be made in writing to the Secretary for transmission to the Board, embodying such details of the conference and such review of the proceedings as will be of benefit to the members and employees of the Board. Such report shall be made prior to the next regular meeting following the conference.

SECTION 20. The minutes of regular and special meetings, reports of the Secretary, and reports of any matter to be officially considered at a Board meeting shall be sent to each member of the Board at such time prior to the meeting as will afford opportunity to the member to become familiar with the matter.

SUBMISSION OF PLANS.

SECTION 21. Plans for such public improvements as come under the supervision of the State Board of Health shall be submitted to the Secretary of this Board by the proper officials of the municipality contemplating the improvement. Such plans shall be accompanied by a formal request for approval signed by such officials and a copy of the resolution or ordinance of council adopting such plans and directing their submission to this Board and no proposition involving any municipal improvement shall be acted upon by the Board until the provisions of this section are fully performed.

SECTION 22. When such improvements are contemplated by any person, firm or incorporated company, the plans shall be accompanied by a request for approval signed by the person, firm or the officers of the company. If the improvement involves the water supply of a municipality or the sewerage or drainage of any land or lands wholly or partially within an incorporated city or village, there shall also be furnished the approval of such plans by the council and other proper officials of the municipality.

SECTION 23. The Secretary of the State Board of Health is directed to refuse to receive plans for public or private improvements when such plans are not accompanied by the papers required in sections 21 and 22.

SECTION 24. Upon receipt of such plans in the form prescribed they shall be referred by the Secretary to the engineering department for investigation. If

the plans are adequate as to detail, specification and other information they shall be investigated and reported upon by the engineering department. If the plans are incomplete as to detail, specification or other information the chief engineer shall notify the Secretary who shall require the submission of such other data as may be necessary and if deemed desirable this information shall be furnished on special blanks prepared for the purpose.

SECTION 25. When plans are submitted which are improperly prepared, or based on insufficient or inaccurate data or contain features known to be unsuitable, the chief engineer, at his discretion, may reject such plans and in such case shall return the plans to the Secretary with his objections thereto.

SECTION 26. Plans which have been officially submitted and referred to the engineering department shall, after being investigated and reported upon, be filed in the engineering department and shall not be altered or revised. If alterations or revision is necessary such changes must be made by submitting a new plan. At the discretion of the Secretary and chief engineer plans shall be open to inspection by any person, but under no circumstances shall any plan or set of plans be removed from the offices of the Board by any person not an employe of the Board.

ORDER OF BUSINESS.

SECTION 27.

1. Roll Call.
2. Public Hearings (to be referred to executive session).
3. Executive Session:
 - (a) Consideration of matters presented at public hearings.
 - (b) Reading of Minutes.
 - (c) Reading of Monthly Report of Secretary.
 - (d) Reports of Committees:
 - Finance Committee.
 - Executive Committee.
 - Engineering Committee.
 - Special Committees.
 - (e) Old Business.
 - (f) New Business.
 - (g) Place of meeting.

Adjournment.

AMENDMENTS.

SECTION 28. These rules and by-laws may be amended at any regular meeting of the Board by a majority vote of the members of the Board.

The Board then took up for consideration the condition of the sewage purification plant at Geneva.

It was moved by Dr. Miller and seconded by Dr. Grube that the report of the Board's engineer be now approved and confirmed.

The roll call upon the adoption of this motion resulted as follows: Yeas, Messrs. Hasencamp, Grube, Sutton, Miller, Warner and Hartzell. Nays, none.

It was thereupon moved by Dr. Miller and seconded by Dr. Grube that it is hereby declared to be necessary that the village of Geneva be required to reconstruct and enlarge the sewage purification plant of the

village in a manner satisfactory to the State Board of Health within one year from this date.

The roll call upon the adoption of this motion resulted as follows: Yeas, Messrs, Hasencamp, Grube, Sutton, Miller, Warner and Hartzell. Nays, none.

The Secretary was instructed to send a copy of this order to the mayor and council of the village of Geneva.

The Board then took up for consideration the complaint in regard to the pollution of the East Branch of the Portage River by the sewage of Fostoria.

An opportunity having been given the city of Fostoria through its officers, to be heard regarding said complaint, and in discussion both by the members of the Board and the officers representing said city regarding said conditions, no evidence, protest, or remonstrance being filed against the action or findings heretofore made, it was moved by Dr. Miller and seconded by Dr. Grube, that the reports of the Board's committees be now approved and confirmed.

The roll call upon the adoption of this motion resulted as follows: Yeas, Messrs. Hasencamp, Grube, Sutton, Miller, Warner and Hartzell. Nays, none.

It was thereupon moved by Dr. Miller and seconded by Dr. Grube to require the city of Fostoria to present for approval, plans for the improvement of the sewage disposal plant and to make such improvements within six months after the date of approval of the order by the Governor and the Attorney General.

The roll call upon the adoption of this motion resulted as follows: Yeas, Messrs. Hasencamp, Grube, Sutton, Miller, Warner and Hartzell. Nays, none.

Thereupon it was moved by Dr. Miller and seconded by Dr. Grube that the reports and findings of the Board be now transmitted to the Governor and the Attorney General for their action thereon.

The roll call upon the adoption of this motion resulted as follows: Yeas, Messrs. Hasencamp, Grube, Sutton, Miller, Warner and Hartzell. Nays, none.

Consideration was then given to the report of the engineer and the statements of the village engineer on sewerage condition and water supply for Napoleon.

Dr. Sutton moved that the matter be referred to the Engineering Department for a report as to the advisability of proceeding under the Bense Act. The motion was seconded by Dr. Miller.

Those voting in the affirmative were Messrs. Hasencamp, Grube, Sutton, Miller, Warner and Hartzell.

In the negative, none.

Dr. Warner called attention to the Second National Conference on Housing in America to be held in Philadelphia, December 4th, 5th and

6th, 1912, and moved that the president go, or send a committee of one to attend the conference. The motion was seconded by Dr. Miller.

Those voting in the affirmative were Messrs. Hasencamp, Grube, Sutton, Miller, Warner and Hartzell.

In the negative, none.

On motion of Dr. Miller, seconded by Dr. Sutton, the Board adjourned to meet in Cincinnati, at 8 P. M., December 12th, 1912.

Attest:

E. F. McCAMPBELL,
Secretary.

Approved December 12th, 1912.

DECEMBER MEETING

1912

The regular monthly meeting of the State Board of Health was held at the Havlin Hotel, Cincinnati, Thursday evening, December 12th, 1912, at 8 o'clock.

There were present Drs. Hasencamp, Grube, Sutton and Warner, Mr. Hartzell and Mr. Hill.

It was moved by Mr. Hill and seconded by Mr. Hartzell to approve the minutes of the November 21st, 1912, meeting.

Those voting in the affirmative were Messrs. Hasencamp, Grube, Sutton, Warner, Hartzell and Hill.

In the negative, none.

It was moved by Dr. Grube and seconded by Mr. Hill to approve the report of the Secretary for the month of November.

Those voting in the affirmative were Messrs. Hasencamp, Grube, Sutton, Warner, Hartzell and Hill.

In the negative, none.

It was moved by Mr. Hill and seconded by Mr. Hartzell to approve the report of the Finance Committee, this being a statement of expenditures from November 16th to and including November 30th, 1912, and a statement of balances available on December 1st, 1912.

Those voting in the affirmative were Messrs. Hasencamp, Grube, Sutton, Warner, Hartzell and Hill.

In the negative, none.

Mr. Hill, as Engineering Committee, then presented his report and the matters were taken up in the following order:

On motion of Dr. Warner, seconded by Dr. Grube, it was voted to disapprove the proposed sewerage and sewage purification for Wildwood Addition, near Toledo, as shown on plans of Mr. Joseph Hofman, civil engineer, and Mr. George Champe, consulting engineer for The Wiltsie Realty Company, and submitted by Mr. R. B. Wiltsie, president of the said company, on December 5th, 1912.

Those voting in the affirmative were Messrs. Hasencamp, Grube, Sutton, Warner, Hartzell and Hill.

In the negative, none.

The Secretary was instructed to advise the company and their engineers that while the general design of the sewer system is satisfactory, the proposed method of treatment is inadequate.

It was moved by Dr. Sutton and seconded by Mr. Hartzell to approve the plans and specifications for a proposed sewer in Gradolph Avenue, West Toledo, known as local Sanitary Sewer No. 1, Main Sewer District No. 2, submitted by Mr. Wm. H. Gould, civil engineer, of Toledo, on November 21st, 1912, subject to the following conditions:

1st. That the Board of County Commissioners of Lucas County have prepared and submitted to the State Board of Health prior to April 1st, 1913, plans and specifications for a main sewer or sewers and sewage purification works in Main Sewer Dist. No. 2, Lucas County, the necessity for which was declared in a resolution adopted by the State Board of Health August 15th, 1912; and,

2nd. That this approval shall be void unless the proposed sewer shall be installed prior to June 1st, 1913.

Those voting in the affirmative were Messrs. Hasencamp, Grube Sutton, Warner, Hartzell and Hill.

In the negative, none.

It was moved by Dr. Grube and seconded by Dr. Sutton to approve the plans and specifications for proposed sewerage and sewage purification for the Home for the Aged and Infirm Deaf near Westerville, submitted by Mr. W. E. Chapman, superintendent of the home, November 26th, 1912, subject to the following conditions:

1st. That the sludge be removed from the septic tank at intervals not greater than one year and that it be disposed of by burial;

2nd. That the plant be enlarged and otherwise modified when required by the State Board of Health; and,

3rd. That this approval be void unless the plant shall have been installed prior to June 1st, 1913.

Those voting in the affirmative were Messrs. Hasencamp, Grube Sutton, Warner, Hartzell and Hill.

In the negative, none.

The report of the engineering department on examination of test well installed preliminary to the development of a proposed new public water supply for the city of Ironton was taken up for consideration.

In addition to the recommendations in the engineering department report Mr. Hill offered the following:

"Your committee begs leave to add to the recommendations of the engineering department a few remarks on sources of water supply such as the bar upstream from Ironton has proved to be. In the first place this is not a gravel and sand bar in the ordinary sense, but a porous portion of the river bank or channel. It represents nothing in the shape of a natural filter and, as the analyses show, the water drawn from the bar is all, or largely, ground water from the Kentucky shore. Its hardness when compared to the Ohio River water would undoubtedly condemn it for a public water supply even though the quality and quantity were satisfactory. The quality as shown by analysis is not satisfactory

and the continued presence of the colon bacillus in 1 c.c. simply verifies previous experiments of your committee in testing similar alleged sources of water supply found in the sand and gravel bars of the Ohio River. All of these have shown gas forming organisms, due doubtless to the decomposition of organic matter, some of which had been deposited there ages ago and some having been added from time to time from the solid sewage content of the Ohio River. The city of Ironton has expended over \$86,000 on an experiment to obtain water from this bar. It now has a judgment standing against the city in favor of the Harrison Construction Company for \$12,000 more, making a total of \$98,000 expended, or in prospect, in exploiting a source of water supply that should never have been given any serious consideration by the city officials, because of the abundant evidence from other cities as large or larger than Ironton, on the Ohio River, which have attempted to obtain a public water supply in the same manner and failed. In approving the report of the engineering department as engineering committee, therefore I wish to do so in the most emphatic way, that the action of the Board, as I hope, may be expressed in an unmistakable manner to the officials of this misguided municipality."

It was moved by Dr. Warner and seconded by Mr. Hartzell that the Board does find from the report of its engineering department that the test of November 18th to November 26th, 1912, authorized by the State Board of Health October 20th, 1910, gave unsatisfactory results; and that a copy of the said report be sent to the Governor and Attorney General, and to the mayor and council of the city of Ironton, and that the Governor and Attorney General be requested to consider the report with a view to approving the order of the State Board of Health transmitted to them under date of February 18th, 1911.

Those voting in the affirmative were Messrs. Hasencamp, Grube, Sutton, Warner, Hartzell and Hill.

In the negative, none.

Dr. Grube presented his report, as a delegate to the Second Annual Conference of the National Housing Association held in Philadelphia, December 4th, 5th and 6th, 1912:

REPORT OF CONFERENCE OF THE NATIONAL HOUSING ASSOCIATION.

To the State Board of Health.

GENTLEMEN:—Upon the request of the President of the Board, I attended the Second Annual Conference of the National Housing Association held in Philadelphia, December 4th, 5th and 6th. This conference was largely attended, over fifty cities and twenty states being represented.

The object of this association is to do away with the slum dwellings, which it was demonstrated exist not only in all cities, but even in villages and in the country. This association offers the assistance of its experts to States, municipalities and others in obtaining and enforcing laws and ordinances to secure better housing conditions.

Starting from the fundamental proposition that the family is the unit upon which the civic welfare rests, everything possible should be done to promote the welfare of the home life of the family. To secure the best results the house should be of adequate size, have abundance of light, pure air, pure water and adequate provision for disposal of house wastes. These and allied topics were the matters discussed by experts at this conference. Much has been accomplished already but many of the greatest problems remain unsolved.

That every family should own its own home is an obvious proposition. In order to bring about this condition as far as possible several general plans were discussed. Public or private benevolence was characterized as un-American, and condemned. The building association plan as practiced in this country was commended; but, under it the interests of the individual are not sufficiently protected and he, too often, loses all he has invested because of his inability to complete his part of the contract.

The community plan as practiced largely in England was highly praised. Here, upon the payment of a moderate sum a man gets the ownership of his house and makes stated payments. In case he is obliged to discontinue payments and give up his house a liberal proportion of what he has paid reverts to him.

The discussion of these questions naturally led to the discussion of other closely allied economic questions. As stated by one speaker, so long as ten million men in this country earn less than thirteen dollars per week, ten million actual or potential families cannot hope to own any kind of a home, therefore, better industrial conditions are imperative.

The question of transportation is also an important one because if that is rapid, intervals between cars short, and the fare low, the workman can live at a greater distance from his work, where land values are lower, and because of this he can afford better living conditions.

Following are some of the subjects discussed:

- Health Departments and Housing.
- Financing the Small House.
- Regulation by Law.
- Garden Cities.
- Instructive Sanitary Inspection.
- What are the Best Types of Wage-Earners' Houses?
- Property Division, Lot Depths, Height regulation.
- Suburban and Rural Housing.
- Room Overcrowding and the Lodger Evil.
- The Factory and the Home.

While the main topic of the conference was better housing for our poorer classes, the discussion led out in many other directions of civic betterment, and the conference was well worth attending by health officials and others interested in the betterment of living conditions.

Respectfully submitted,

R. H. GRUBE,
Committee.

It was moved by Mr. Hill and seconded by Dr. Sutton to include this report in the minutes.

Those voting in the affirmative were Messrs. Hasencamp, Grube, Sutton, Warner, Hartzell and Hill.

In the negative, none.

Mr. Hill called attention to efforts being made to better sanitary conditions and to the necessity of continued study on the part of the State Board of Health to keep abreast of the times in advancing the status of knowledge of these subjects. He wished to impress upon the Board that something must be done, and he hopes to be able to present some suggestions for a method of procedure to determine what can be done to advance our knowledge of wastes disposal. Mr. Hill also spoke of conditions at Glasgow.

Dr. Hasencamp called attention to what is being done in some cities in the way of better housing conditions for the poor and regretted that more cities are not doing something along this line. He spoke of the work being done by the Octavia Hill Association in Philadelphia, and in Cleveland, Columbus and Detroit.

Dr. Warner spoke of the results to be obtained by bringing to the attention of the people the results obtained by better housing conditions and of the good that would come from the co-operation of moneyed men interesting themselves in the conditions that will lead to better housing for the prevention of disease as well as for general health.

The Secretary presented a request from Mr. William H. Gould, sanitary engineer for Lucas County, that the Board, pursuant to the provisions of Section 6602-2 of the General Code, declare that it is necessary to construct sewerage in District No. 3, Lucas County.

Dr. Warner moved that a committee, consisting of the president, Dr. Hasencamp, and the chief engineer, Mr. Dittoe, be appointed to make an investigation and determine the necessity for sewerage for this district. This motion was seconded by Mr. Hill.

Those voting in the affirmative were Messrs. Hasencamp, Grube, Sutton, Warner, Hartzell and Hill.

In the negative, none.

The Secretary presented the names of health officers, who had been appointed by their respective councils to serve in lieu of a board of health and endorsed by the president of the medical society of the county in which they reside.

It was moved by Mr. Hill and seconded by Mr. Hartzell to approve these health officers.

Those voting in the affirmative were Messrs. Hasencamp, Grube, Sutton, Warner, Hartzell and Hill.

In the negative, none.

The Secretary presented a communication from Mr. L. White Busbey, Secretary of the International Joint Commission, which is investigating the matter of the pollution of the boundary waters between the United States and Canada, inviting the Board to a preliminary conference to be held at the Iroquois Hotel in Buffalo, N. Y., December 17th. 1912.

It was moved by Mr. Hill and seconded by Dr. Sutton that the president be authorized to appoint a member of the Board to attend this conference.

Those voting in the affirmative were Messrs. Hasencamp, Grube, Sutton, Warner, Hartzell and Hill.

In the negative, none.

(The president then appointed Mr. John W. Hill to represent the Board at this conference.)

The Secretary recommended that three old typewriters be exchanged for three new ones, two of these having an extra long carriage for special work, at a cost of \$149.10.

On motion of Mr. Hill, seconded by Dr. Warner, this recommendation was approved.

Those voting in the affirmative were Messrs. Hasencamp, Grube, Sutton, Warner, Hartzell and Hill.

In the negative, none.

The Secretary presented the resignation of C. H. Robinson, as laboratory helper, to take effect January 15th, 1913.

On motion of Dr. Sutton, seconded by Mr. Hartzell, this resignation was accepted.

Those voting in the affirmative were Messrs. Hasencamp, Grube, Sutton, Warner, Hartzell and Hill.

In the negative, none.

The Board then adjourned to meet the fourth Wednesday, in January, 1913, in Columbus.

Attest:

E. F. McCAMPBELL,
Secretary.

Approved January 22nd, 1913.

RESUME OF REPORTS PRESENTED TO THE BOARD BY THE SECRETARY.

JANUARY MEETING.

(The part of this report referring to work done in 1911 was published in the 1911 Annual Report.)

COMMUNICABLE DISEASES.

Smallpox.

Since the last meeting cases of smallpox have been reported in five counties. Three of these were in Defiance, seven in Hamilton (Cincinnati), two in Marion, four in Morgan and others in Lucas. The cases in Lucas County have not yet been fully reported.

One of the physicians at Curtice, Ottawa County, reported to Dr. Hasencamp that four persons who were broken out with smallpox had called at his office for advice, and Dr. Hasencamp requested that the epidemiologist be sent to that locality to ascertain just what the situation was and what measures were being taken to prevent spread of the disease. Accordingly, the epidemiologist visited Jerusalem Township, Lucas County, on the 6th of January. His report may be found on a subsequent page.

The commissioners of Warren County requested an inspection of a site upon which they propose to erect a tuberculosis hospital. The president appointed Dr. Grube a committee, who, in company with Mr. Shirer of the Board of State Charities, visited Lebanon January 12th, to make the inspection.

STATE INSPECTOR OF PLUMBING.

The State Inspector of Plumbing inspected the plumbing in school buildings at Washington C. H., and Ironton, and visited Dayton to explain certain features of the Plumbing Code to the association of plumbers.

The architects of 34 buildings in course of erection have been notified that the work installed must be in conformity with the law.

Blue prints and specifications of the tests to be conducted at the University of Illinois have been submitted to various plumbing inspec-

tors,, master and journeymen plumbers throughout the State for their criticism and suggestions, to be used in connection with these tests.

The inspector has distributed 5000 copies of the laws governing construction, installation and inspection of plumbing and drainage to health officers, architects, master and journeymen plumbers, and has explained certain requirements about which there was some doubt.

The Attorney General has been asked to give an opinion as to what recourse the State Board of Health has to prevent Mr. Luff from circulating the book written by him containing misrepresentations regarding certain appliances in which he is financially interested and which have not been approved by our Board.

The superintendents of the public institutions who have failed to reply to the letter giving recommendations for improvements found necessary in the plumbing of their institutions have again been notified of these recommendations, with a statement that the Board will expect that immediate attention be given the matter.

PUBLIC WATER SUPPLIES.

New Concord and New Lexington were visited by one of the engineers, and reports have been prepared for consideration at this meeting upon the supply proposed for New Lexington, and the proposed deferrization plant for Lodi.

An informal report was prepared of an inspection of another site proposed for the location of public supply wells at New Concord, made upon the request of the consulting engineer for The New Concord Real Estate Company; and the company has been advised that it will be necessary for them to learn by suitable tests which of the proposed sources is to be used and whether a sufficient quantity of water may be obtained, before the matter can be considered by the Board.

Inspection has been made of the existing water supply at Ashland, Fostoria, Leipsic, Piqua, Pomeroy and South Charleston, and one of the engineers is in Cleveland engaged in the investigation of the use of hypochlorite of lime in the purification of the water for that city.

SEWERAGE AND SEWAGE PURIFICATION.

Reports have been prepared for consideration upon proposed sewerage for District No. 4 at Bowling Green, and for District No. 4, Canton. Also a report upon sewerage conditions at Port Clinton, made upon complaint of an alleged nuisance.

Existing sewerage at Fostoria and Piqua has been inspected and the purification plants at Ashland, Jackson and London have been examined by one of the engineers.

The sewage purification plant under construction at Shreve was inspected and the engineer reported that the improvements have in gen-

eral conformed to the plans approved but the condition requiring the construction of three filter units immediately instead of two, as provided for in the plans, has not been complied with. The mayor and council have been notified that in the opinion of the Board the entire area of three units is immediately necessary and they were asked to let us know whether the third unit will be provided.

The mayor of Ada has submitted a copy of an ordinance passed December 19th, 1911, in compliance with the condition of the Board's approval of proposed storm sewers for that village on September 14th. The ordinance, however, does not meet the requirements and upon recommendation of the Engineering Committee, was returned to the mayor with the statement that it should be made to meet the conditions imposed by the Board.

NUISANCES.

Owing to the failure of the Marion Township authorities to keep a ditch clean, a public road in Mifflin Township, Franklin County, is overflowed by the backing up of a sewer running through the plant of The Ralston Steel Car Company at East Columbus. This sewer also receives the sewage from the plant and a nuisance has been created. One of the engineers investigated the complaint on December 27th, and a report will be made later on. Since the inspection was made a communication has been received from the health officer of Marion Township in which he states that the trustees of the township have taken the matter up with the trustees of Truro Township, in order to provide sufficient drainage to the outlet of the ditch.

January 3rd, a nuisance at South Charleston, alleged to be due to the connection of water closets with a storm sewer, was investigated by one of the engineers and a report of this is being prepared.

December 29th, the Acting Secretary was notified by the Adjutant General that an emergency appropriation of \$2000. has been allowed by the Emergency Board, to pay rent for the year from February 15th, 1912, and for the purpose of moving and fixing up new quarters outside of the State House. Upon investigation it was found that it will be impossible to move the office into suitable quarters on the amount appropriated.

FEBRUARY MEETING.

COMMUNICABLE DISEASES.

Smallpox.

Since the last meeting of the Board, January 17th, there have been 118 cases of smallpox reported in the following eight counties: Defiance 1, Franklin 8, Hamilton 9, Lucas 81, Madison 5, Morgan 4, Ottawa 3

and Stark 7. The only cities in which smallpox has been reported are Columbus, 8 cases, Cincinnati, 9 cases and Massillon, 6 cases. Eighty of the cases reported in Lucas County were in Jerusalem Township, and cover a period of several weeks. An investigation of the first cases was made by Dr. Stewart of Toledo, but the disease was not treated as smallpox until our epidemiologist went there, confirmed the diagnosis and gave full directions for dealing with the outbreak.

No visits have been made by a medical inspector.

On January 17th, the epidemiologist visited Jefferson Township, Madison County, to investigate cases reported to the authorities as smallpox but in which the diagnosis was in doubt. January 22nd, upon request of the health officer he visited Canaan Township, Madison County, to investigate cases of smallpox. His report of these investigations may be found on a subsequent page.

Scarlet Fever.

February 8th a request was received from a physician at West Salem that an inspector be sent there on account of scarlet fever. The health officer was communicated with by telephone and he also asked that the inspector be sent. The epidemiologist went to West Salem on the 10th of February.

February 1st, upon request of Dr. Grube he visited the Ohio Soldiers and Sailors Orphan's Home at Xenia to investigate cases of scarlet fever. He found there was insufficient accommodations for treating these cases in the manner in which they should be treated.

February 2nd, upon request of Mr. Hill, he went to Reading to find out whether cases of scarlet fever were being reported. His reports may be found upon subsequent pages.

The epidemiologist also visited Arlington Heights, Lockland and Hartwell, neighboring villages, where proper measures were not being enforced to prevent spread of scarlet fever.

A number of complaints have been received from different parts of the state that scarlet fever is present in such mild form that frequently no physician is called and children from houses in which there are cases attend the public school.

PUBLIC WATER SUPPLY.

Proposed or additional water supplies have been investigated by one of the engineers at Dayton, Granville, Springfield and Worthington; and reports have been prepared for consideration at this meeting on the Dayton, Granville and Springfield supplies. Reports have also been prepared for consideration on a proposed deferrization plant for Oak Harbor, plans for which are submitted in compliance with the second condition of the Board's approval of the proposed water supply, and upon a deferrization plant at Leipsic.

Two sites were inspected at Worthington proposed for the location of the public water supply wells and either the Griswold or the Pagles site was thought to be satisfactory as regards surface conditions. The authorities were advised that before any site could be definitely approved it will be necessary to obtain information regarding the quality and quantity, and that the test wells should be drilled and samples of the water analyzed.

The existing water supply at Newark, Versailles and Waverly has been examined by one of the engineers.

A report has been made on the existing supply of Ashland which states that upon inspection it was learned that attempts have been made to supplement the present supply by various methods without the knowledge or approval of the State Board of Health and it is now their intention to add to the public supply by the use of two drilled wells. These wells are poorly located as regards surroundings and may not be suitable. The authorities were so advised, and also that a thorough test should be made if they desire to use them. They were urged to retain the services of a competent sanitary engineer to study the question of an additional water supply so that a comprehensive and permanent improvement may be secured.

A report has been made upon a recent inspection of the existing water supply of Lebanon, which supply is derived from driven wells. The present installation has been satisfactory in supplying the consumers. During the past year a shortage of water was experienced, which was relieved by cleaning the wells of the sand collected within them. No samples of the water were collected and another inspection will be made in the near future, when samples for analysis will be collected to determine the quality of the water.

The council of New Berlin has asked the Board to reconsider its action of January 17th, disapproving the cite proposed for the location of the public water supply wells.

SEWERAGE AND SEWAGE PURIFICATION.

Greenfield, Oak Harbor, Urbana and The Muskingum County Children's Home near Zanesville, were visited by one of the engineers relative to sewerage; and the existing sewerage at Urbana and Versailles, and the purification plant at Marble Cliff were inspected.

Reports for the Board's consideration have been prepared upon sewerage for Canal Fulton, Urbana and Bowling Green, the revised plans for proposed sewerage for District No. 4. Bowling Green being filed in compliance with the agreement entered into at the last meeting of the Board.

A report has been made upon the sewage purification plant at Bellefontaine which indicates that in certain details the plant is being built in violation of the approved plans. Facilities for cleaning the sedimenta-

tion tanks and sludge filters have been omitted and irrigation areas for secondary treatment of the sewage are not provided. The authorities have been notified that without these provisions the plant cannot be expected to operate in an entirely satisfactory manner. The approved plans provide for the application of the tank effluent at the surface of the contact filters. Inspection showed the construction provides for the application at the bottom of the filters and unless extreme care is exercised in the operation of the plant, the application of sewage in this way will without doubt cause trouble, due to clogging of the filtered material. Several cracks were also noted in the concrete walls. The authorities were notified that these defects should be repaired; and also, in order to protect the water supply wells against contamination from sewage seeping through leaky joints, they were urged to remove the vitrified pipe and substitute cast iron pipe along the northerly and easterly limits of the water works property. We have since been informed that the matter has been referred to the construction engineers.

Upon recent investigation of sewerage conditions at Piqua, it was found that a private sewer, receiving a small amount of domestic sewage, is connected to the Race Street storm sewer, discharging into the Miami River, which sewer was approved for storm water only. The need of sanitary sewers in this district of the city, was pointed out to the authorities and they were urged to not permit such connections.

STATE INSPECTOR OF PLUMBING.

January 23rd, the State Inspector of Plumbing went to Cleveland to have a conference with the building and plumbing inspectors relative to the new State Code. February 8th and 9th he visited Urbana, Illinois, where the plumbing tests are to be made. He has also prepared a full report of the work done in his department since February 15th, 1911, and a copy has been furnished each member of the Board.

Late in January, Dr. Warner received a resolution adopted by the Executive Committee of the Grand Council of the United Commercial Travelers relative to the use of roller towels in wash rooms in hotels and barber shops, and also in regard to the use of comforts and blankets in hotels. A copy of this resolution has been sent to each member and the matter is one to be considered at this meeting.

Communications have been received from the Business Men's Association, the Board of Trade of Canton, and from persons living between Canton and North Industry, protesting against the location selected by the city council for a sewage purification plant and requesting that the sewage disposal plant be located several miles farther south. Copies of these communications have been sent to the members so that action may be taken rescinding the former action approving the site proposed by council, if the Board so desires.

Much time has been taken up in referring health officers who are to serve in lieu of a board of health to the president of the medical society of the county in which the appointee lives. In a number of cases the president of the society has failed to reply to our request for his endorsement, and in some cases he has simply replied that the appointee is unknown to him. One hundred and thirty of the health officers have been endorsed. Sixty-eight that have not yet been endorsed by the president of the medical society are former health officers who have been reappointed by their respective councils and these will be presented to the Board for approval.

Dr. McCampbell has reported upon the so-called "Ready-to-Use Disinfection Check" put out by the International Chemical Company, Chicago, Ills., as follows:

1. The claims set forth in regard to its use are approximately correct. The culture of *Bacillus prodigiosus*, which is the test organism with which the threads are impregnated, is not always a sure check that the disinfection of such organisms as the *Bacterium diphtheria* has been accomplished, although in a large majority of cases this would be true.

2. The check is of no value except where access to a laboratory is not to be had. (The company does not claim the converse).

3. The check may be of value in the disinfection applied by the country practitioner in the rural districts.

4. There is nothing new and novel in the check or its use which has not been known for a long time in the bacteriological testing of disinfectants; and,

5. The check would be only of value in gas disinfection.

MARCH MEETING.

COMMUNICABLE DISEASES.

Smallpox.

Since the last meeting, February 15th, there have been 60 cases of smallpox reported, as follows: Athens County, Nelsonville 15; Clark County, Springfield 1; Defiance County, Defiance 1, Sherwood 1; Hamilton County, Arlington Heights 1, Cincinnati 4; Madison County, Deer Creek Township 9; Montgomery County, Dayton 24, Lucas County, Toledo 2; and Tuscarawas County, Uhrichsville 1.

But one investigation was made on account of smallpox. Upon request of Dr. Swartz, Dr. Dick was sent to Deer Creek Township, Madison County. He found a man suffering with a well marked case of smallpox, in the fifth day of eruption. All the family had had the disease except two, who had been vaccinated years ago and were still protected. There had been many exposures in Lafayette, as well as London, and the chances are that there will be many more cases. The patient Dr. Dick saw was to have held a public sale, but this was post-

poned. The authorities were advised to locate all exposed persons so far as possible, vaccinate and keep them under observation the proper length of time. The matter was also reported to the authorities at London and Lafayette, so that proper precaution could be taken by them to prevent spread of smallpox in their towns. It was reported that the first case was a man from Pittsburg, who had several weeks before husked corn for the man seen by Dr. Dick.

Scarlet Fever.

February 27th, the epidemiologist was sent to Etna Township, Licking County, upon request of the village clerk. Several cases of scarlet fever had occurred among school children; and his report may be found on a subsequent page.

February 20th he visited Reading to complete his investigation of scarlet fever in that village and vicinity.

Dr. Rhoads, of Leesburg, reported scarlet fever in adjoining townships and asked to have a medical inspector sent, at local expense, the physicians of the community not agreeing in the diagnosis. Dr. Hegner, medical inspector, was sent to Leesburg March 6th. He saw four cases of undoubted scarlet fever. The children had been sick about six weeks, all were desquamating, and all had enlarged glands in the neck. The first member of the family afflicted, a girl of 14 years of age, was in Hillsboro visiting her grandmother and it was not known whether or not she had entirely recovered. The health officer was advised to communicate with the health officer of Hillsboro, apprising him of the facts. It was also stated that there were two cases of scarlet fever in Hillsboro. The township authorities were advised to insist upon a rigid quarantine until all danger is passed.

March 11th, Dr. Grube went to Bellbrook to diagnose a case of scarlet fever.

Diphtheria.

March 12th, the superintendent of schools at Fairport Harbor reported that there was an unusual number of diphtheria cases in the village and proper measures were not being enforced to prevent spread of the disease. The epidemiologist went to Fairport March 18th. He also investigated a newspaper report of an epidemic of "glandular fever" prevailing in Saybrook Township, Ashtabula County.

February 26th and 27th, Dr. Grube and the Acting Secretary attended the Eighth Annual Conference of the American Medical Association Committees on Medical Education and Public Health, at Chicago. The reports of the meetings, including papers and discussions, will be printed in full in the Bulletin of the Association, and copies will be supplied the members.

SENSE PROPOSITIONS.

Under date of February 27th, the Acting Secretary was advised by the director of public service of Lima, that at a meeting of the council of that city held February 26th, upon the advice of the city solicitor, it was decided to take no further action in regard to the orders of the State Board of Health requiring the city to purify its water supply and its sewage, until the Supreme Court has rendered a decision in the case now before it.

Recent report has been made upon the investigation of the complaint of the clerk of Emerald Township, Paulding County, that the German American Sugar Company is polluting Flatrock Creek.

It was found that this factory has a capacity of handling 900 tons of beets, which produce approximately 135 tons of sugar each day. The wastes from the process are discharged into Big Flatrock Creek. Before being discharged into the creek, however, they receive a certain amount of purification by means of sedimentation. The sanitary wastes and general waste water about the plant receive only one sedimentation period. The lime wastes from the clarifiers receive primary and secondary sedimentation. At the time of inspection the plant was not in operation, so that in order to determine the degree of purification and the possibilities of a nuisance another inspection will be necessary. The complainants were so notified and were requested to let us know when conditions were favorable for another investigation.

WATER SUPPLIES.

The following places have been visited by one of the engineers to investigate proposed water supplies: Akron, Baltic, Canton, Crooksville and Roseville, Malvern, Navarre, New Berlin, Pataskala, St. Clairsville (Provident Coal Company) and Worthington.

Reports have been prepared on the Akron, Malvern, New Berlin, and St. Clairsville (coal company) supplies for consideration at this meeting.

Several sites at Baltic were examined by one of our engineers but objection was raised to the sites proposed on account of the likelihood of future encroachment by building, and the authorities were advised to endeavor to secure a site farther removed from the built up portion of the village and, if possible, a location 1000 feet from any possible source of pollution. Another site has been chosen.

Existing supplies were examined at Mansfield, Tiffin and Willoughby, and a conference was held at Youngstown relative to the supply at Struthers.

The water purification plants were examined at Elyria, Huron, Lorain, Sandusky and Port Clinton, and the experimental Darnall chloride apparatus at the water plant at Youngstown was examined.

Akron and Cleveland were also visited in regard to the treatment of the water with calcium hypochlorite.

Recent as well as previous examinations of the water purification plant at Pomeroy (furnishing water to the citizens of Pomeroy and Middleport) showed an irregularity in the quality of the water. A number of minor changes in construction and operation of the plant, and the absolute necessity at present of improving the operation by providing better facilities for application of the alum, were pointed out to the water company, and they were strongly urged to employ the services of an engineer experienced in the design and operation of water purification plants to go over the plant at Pomeroy and devise proper improvements. They replied that they were desirous of furnishing the best water possible, but seemed to think it was the duty of the State Board of Health to furnish the advice.

Report upon recent inspection of the water purification plant at Waverly indicates that the plant in general has been constructed in a satisfactory manner and in accordance with the plans approved. The operation of the plant was found to be in general satisfactory, though certain features in which improvements would add to the efficiency of the plant were pointed out to the authorities. The chemical treatment of the water should be improved and the board of trustees of public affairs was advised to arrange to have a chemist, experienced in water purification, make frequent analyses to secure at all times proper chemical treatment of the water, it not being possible for our engineering department to give any individual plant regular attention. Our analyses indicated a marked increase in incrustants, showing that the quantity of soda ash as calculated at the time the plant was placed in operation is at present insufficient to soften the water. The iron content has increased materially but the plant is removing this constituent. The attention of the authorities was also called to the importance of maintaining accurate and complete records of the operation of the plant.

Supplementary reports have been made on examinations of the existing water supply at Newark, which show that analyses of the water obtained from the infiltration system indicate that the water is unsatisfactory in quality. It was learned that at various times recently water has been pumped from the river directly into the distribution system, necessitated, no doubt, by the failure of the infiltration units to furnish the required amount of water. The use of the infiltration system at Newark was temporarily allowed and up to the present time our examinations have not demonstrated the suitability of the water derived from the strainer units, due to some extent to the fact that the units installed are of inadequate capacity to furnish at a proper rate of infiltration the water required by the city. The merits of the infiltration system cannot be definitely learned until sufficient capacity has been provided to secure a proper rate of flow into the system. The authorities at Newark were

urged to take up the problem of the city's water supply and decide upon the method of procedure. An unusual number of cases of typhoid fever have been reported as prevailing in Newark during the past two or three months and these may be due to the condition of the public water supply.

An informal report has been prepared by the engineering department on the sanitary survey of Lake Erie at Cleveland, but the scope of the survey is too limited to permit of general conclusions regarding the pollution of this lake and the Cleveland water supply by sewage from that city. The report recommends that, as the city of Cleveland has engaged experts to study the water supply and sewerage conditions with a view to their improvement, it appears advisable for this Board to await results of these studies before making further extensive examinations at Cleveland. A copy of the report was sent to Mr. Hill, and upon his advice, a copy was sent to the Cleveland authorities.

In accordance with authority given at the last meeting of the Board, the Acting Secretary, on March 2nd, approved the making of 40 connections to the water mains in Bremen anywhere in the district east of Fort Street, and relying on the statement of Dr. Turner, a member of the board of trustees of public affairs, that he has the only well outside of the area prescribed that is affected by salt, consent was given for a tap on his lot located on Marietta Street near Fort Street.

ICE SUPPLY.

The board of health of Mt. Vernon asked our Board to examine the ice harvested from the artificial ponds of W. L. McIntire, east of that city, having refused a permit to sell this ice for domestic purposes, doubting its purity on account of the effluent from the sewage disposal plant at the State Sanatorium being discharged into the run from which the water is taken to fill the ponds. Accordingly, the bacteriologist, Mr. Berry visited Mt. Vernon February 15th, inspected the source of this ice and collected samples to determine the quality of the supply harvested this season.

A report was made and furnished the Board of Health and Mr. McIntire, the conclusions of which were:

(1) The quality of the water in Centre Run is not seriously affected by the effluent of the Sanatorium sewage disposal plant because first, this sewage is disinfected, and second, the dilution and natural purification to which it is subjected is sufficient to render harmless a very high percentage of the pollution entering it.

(2) The process of freezing and subsequent storage of ice removes a very high percent. of bacteria or renders them non-pathogenic.

(3) Analysis of the ice at the dam shows that purification of the water is practically as complete there as it is at the ponds.

(4) Analysis of samples of the pond indicated that no flooding of the ice occurred and that the two crops are of about the same quality.

(5) More than ordinary precautions seem to have been taken to protect the water supplying the ponds and keep the surroundings in good condition.

(6) Taking all the above into consideration and basing an opinion upon the results obtained, the present crop of ice can be considered safe for domestic purposes, and there is nothing in the analysis to indicate that it might be deleterious to health. There is an aesthetic objection, of course, to having sewage effluents enter water from which ice is frozen, but this is an objection for the consumer and cannot be classed with objections based on analytical results in determining purity.

It was recommended that if in the future there is any doubt concerning the quality of this ice, the board of health be informed by Mr. McIntire when he fills his ponds for the winter, and that samples of this water be submitted to our laboratory for examination.

SEWERAGE AND SEWAGE PURIFICATION.

The chief engineer visited Canton relative to proposed sewage purification, and Youngstown in regard to sewerage and sewage purification for The Realty Trust Company.

The existing sewerage conditions at Cincinnati and Forest were inspected, and the chief engineer examined the sewage testing station at Akron.

Reports have been prepared for consideration at this meeting upon proposed sewerage or sewage purification at Andover, New Berlin, Oak Harbor, Toledo (E. T. Collins Sub-Division) and Urbana. It will be recalled that plans for sanitary sewers for Urbana were presented at the last meeting and approval was withheld until plans for sewage purification were submitted. These are now submitted.

An informal report has been made upon a conference held with one of the engineers and W. B. Hollingsworth, county surveyor, at Zanesville, for the purpose of selecting a suitable site for the proposed purification of the sewage at the Muskingum County Children's Home. One engineer found that the location proposed for the plant was unsatisfactory, due to its proximity to the main building and the possibility of endangering the source of water supply of the institution. He also reported that the location to the east of the institution is sufficiently removed from habitations, but is at times inundated, and it is likely that an open filter would receive considerable drainage during the flood stages of the creek. It is understood that the county surveyor will prepare tentative plans embodying the use of clarification tanks to be submitted to our Board for approval.

An informal report has been made upon the examination of an existing storm sewer at Versailles by one of the engineers. It was found that this sewer was constructed for surface drainage but is used to carry domestic wastes. This is especially objectionable on account of the proximity of the public water supply wells to the ditch receiving the discharge from the sewer. The plans were never submitted to the State Board of Health. A letter was addressed to the mayor and council, call-

ing attention to these facts and advising that an ordinance be passed prohibiting the use of this sewer for sanitary purposes, and also advising that all existing connections be located and removed.

Report upon recent inspection of the sewage purification plant at Marble Cliff shows that the leakage into the sewer, found in previous analyses, has materially decreased; that considerable difficulty is still experienced with algal growth, and the use of copper sulphate is again advisable; and that there is a good efficiency, as shown by these analyses by using the plant on the sedimentation principle.

One of the engineers investigated the conditions attending the present method of disposal of sewage at the District Tuberculosis Hospital at Springfield, maintained by Champaign, Clark and Madison counties. His report indicates that the present conditions are unsatisfactory and that improvements should be made. The trustees of the Institution were advised to employ a competent sanitary engineer to devise proper methods for the disposal of the sewage at the Institution.

In disapproving plans for sewage disposal for Sandusky, the Board advised that search be made for a water supply beyond the influence of the sewage of the city. We have been notified that the committee on health, to whom this matter was referred, recommended that council take up the matter of a sewage disposal plant in the near future.

Forty-one inspections have been made by representatives of the Board, and thirty-two places have been visited.

WASTE DISPOSAL PLANT.

The council of the city of Cincinnati has appointed a commission, consisting of three of its members, the mayor, and director of public service, to make an investigation with a view to establishing a municipal garbage disposal plant. On request from the chairman for information concerning wastes disposal a copy of our report on the collection and disposal of city wastes in Ohio was furnished the commission.

STATE INSPECTOR OF PLUMBING.

The State Inspector of Plumbing has made the following visits:

February 12th, a meeting was held with the master and journeymen plumbers of Dayton, when the provisions of the state plumbing code were explained.

February 13th, 14th and 15th, the inspector read a paper before the Convention of Ohio Master Plumbers, at Canton, and also explained the provisions of the plumbing code.

February 16th an inspection was made at the institution for the Blind at Columbus.

February 20th, at the request of the State Inspector of Workshops and Factories, an inspection of the Outlook Building, Columbus, was made with said inspector in regard to toilet rooms for female employes.

February 29th the inspector addressed the master plumbers of the city of Columbus relative to the State Plumbing Code.

February 27th, March 4th, 5th, 8th, 11th and 13th, conferences were held with representatives from Shreve, Columbus, Cleveland and Lima, relative to plumbing construction for certain buildings in their respective cities; and March 13th the plans for the plumbing to be installed in the armory building at Paulding were reviewed and changes recommended.

March 7th, Ironton was visited, a final inspection made of the Campbell school building and a certificate of approval was issued March 8th.

March 9th an inspection was made at the Columbus State Hospital in reference to remodeling the toilet rooms.

March 11th, at the request of Mr. Hill, member of the Board, a conference was held at his office with the State Inspector of Plumbing, the Acting Secretary, Mr. Luff, sanitary engineer of Cleveland, and Mr. McMahon, building inspector of Toledo, with reference to proposals that had been submitted to the State Board of Health for approval. As many of these proposals are, in the judgment of the inspector and the Acting Secretary, not within the jurisdiction of the Board to consider, this meeting was arranged in order to arrive at some definite conclusions as to the jurisdiction of the Board.

The result of the conference was to submit to the Attorney General a letter asking his opinion as to the Board's jurisdiction in the questions raised. An opinion has been promised by March 21st, the date of the Board's meeting.

APRIL MEETING.

COMMUNICABLE DISEASES.

Smallpox.

Since the last meeting of the Board, March 21st, there have been 47 cases and one death from smallpox reported in the following twelve counties: Athens, Nelsonville 4; York Township 16; Columbiana, East Liverpool 1; Crawford, Crestline 6; Cuyahoga, Cleveland 1; Greene, Bath Township 3; Hamilton, Cincinnati 3; Norwood 1; Hocking, Ward Township 1; Huron, New London 1; Lucas, Toledo 1; Madison, Fairfield Township 6; London 2; Portage, Ravenna 1; and Tuscarawas, Uhrichsville 1 case and 1 death.

The cases at Crestline were contracted from a daughter of the family who had been working in a hotel at Kalamazoo, Michigan. She was sick while at home but no physician was called. Upon inquiry it

was learned that a case of smallpox had developed in the hotel at Kalamazoo a day or two before she left for her home.

But two inspections have been made on account of smallpox.

March 20th, upon request of Mr. Hill, Dr. Hegner went to Norwood to see a suspected case. With the health officer and one of the local physicians, he saw the patient, the wife of the janitor of one of the bank buildings, and found a moderately severe case of smallpox. He advised the patient being sent to the Branch Hospital for Contagious Diseases, fumigation of the rooms, and vaccination of the husband and any other persons known to have been exposed to the disease.

March 26th, the epidemiologist, Dr. Boudreau, visited Lilly Chapel, Madison County, upon request of the township clerk. His report may be found on a subsequent page.

The committee appointed at the last meeting to consider the question of a Tuberculosis Exhibit, Dr. Grube and the Secretary, held a conference in the Secretary's office with Dr. Paterson, the Secretary of the Ohio Society for the Prevention of Tuberculosis, on April 2nd, and will present a report.

The committee appointed to consider the health officers whose appointments were protested, Dr. Sutton and the Secretary, met in the office of the Secretary April 4th, and will present a report.

THE BENSE ACT.

On Tuesday, April 2nd, the Supreme Court handed down a decision in the case of The State Board of Health et al. vs the City of Greenville, Ohio, et al. The written opinion has not yet been handed down but the syllabus is as follows:

"The act of the General Assembly passed April 7, 1908, entitled 'An act to authorize the State Board of Health to require the purification of sewage and public water supplies and protect streams against pollution' now being Section 1249, *et seq.*, of the General Code of Ohio, is a valid and constitutional exercise of the police power of the state."

The judgment of the circuit court was reversed and the case remanded with instructions to sustain demurrer to the petition and for further proceedings according to law. The opinion was written by Judge Donahue and concurred in by all the court.

PUBLIC WATER SUPPLIES.

The following places have been visited by one of the engineers to investigate proposed water supplies; Baltic, Canton, Centerburg and Hamilton.

Reports have been prepared for consideration at this meeting on a site for Baltic; enlargement of the water purification plant at Conneaut;

the development of a proposed supply at Malvern, and the necessity of purification of the water supply at Struthers.

Existing water supplies have been investigated at Canton, Carthage, Elmwood Place, Hartwell, Lockland, Niles, Struthers, Warren, Delaware, Galion, Shelby, Upper Sandusky, Wyoming and Youngstown.

The report made of a recent examination of the water purification at Conneaut indicates that the plant is of insufficient capacity and has been operated at an excessive rate for several years, the result being to produce an effluent which is at times unsatisfactory. Samples recently examined show objectionable, high bacterial content. The company is to enlarge the plant, however, plans having been prepared by Messrs. Burgess and Long, consulting engineers.

An informal report has been made upon the contemplated water supply for Crooksville and Roseville. The Muskingum Water Company of Zanesville proposes to install a supply obtained from the deposits in the valley of the Muskingum River below Taylorsville and pump to a distributing reservoir some distance east of Crooksville and Roseville. The project is to be one of some magnitude and the company was advised to secure the services of a competent consulting engineer to investigate the feasibility of all available sources of supply before adopting this plan.

Upon recent examination of the water purification plant at Elyria it was found that the plant is producing an effluent of good quality from a sanitary standpoint. It was observed that incomplete records are kept of operation. The attention of the authorities was called to the necessity of keeping these records that they may know the amount of water pumped, as the quantity of chemical used is determined upon this data and the degree of efficiency can only be determined by the keeping of such records. The director of public service replied that he had located and stopped a break in a 4-inch main and that they are at present pumping 400,000 gallons per day less than when our engineer visited the plant.

It was learned, when making a recent examination of the water supply at Greenfield, that during the past winter the present supply from two wells in the bed of Paint Creek has been inadequate and it has been necessary to pump creek water direct into the distribution system. Samples examined late in January showed the presence of intestinal bacteria. The board of trustees of public affairs was notified that the supply should be considered with suspicion and of the urgency of immediately providing for an extension of the supply.

An examination was made of the so-called Hedges Spring supply, recently installed at Mansfield, analysis of a sample of water taken from the pumping station near the new supply, which represented a composite of all the wells, showed the water to be of a high degree of purity and safe for domestic purposes. It was learned that the intention was to utilize the available capacity of the new supply by making connections

with that part of the distribution system at present furnished by the old well supply. The director of public service has notified us that this will only be done at times when the pressure or supply in the low line is low and that when such change is made the State Board of Health will be notified.

Report made of a recent examination of the present supply at Piqua, obtained from an hydraulic canal, shows this to be unsatisfactory water from a sanitary standpoint for general domestic purposes. Analyses of the water indicated the presence of high organic content and of serious pollution. The supply is but partially used, private wells serving a portion of the population. These wells are largely shallow dug wells, and can not be considered a safe water supply. The authorities were urged to take steps in the near future to secure a safe and potable supply.

While in Sandusky one of the engineers noted the fact that the water purification plant was out of service and that raw water from Sandusky Bay was being pumped into the distribution system. He was informed that this practice of supplying raw water has been employed occasionally in the past, due to the inability of the purification plant to supply the necessary amount of water. The attention of the health officer was called to this danger to the health of the residents as well as the traveling public, and he was advised to give prompt warning through the newspapers of the danger of using the supply while the filtration plant is not in operation, and also to urge council to take immediate steps to enlarge the plant to avoid future interruption in its operation.

The water supply of Tiffin, obtained from drilled wells, was found upon examination to be of good sanitary quality and suitable for domestic use, but it was learned that the emergency intake, drawing a supply from the Sandusky River, is frequently employed and furnishes a water which is not satisfactory as a public supply. The attention of the superintendent of water works was called to the danger of using the Sandusky River water for domestic purposes and to the importance of warning the residents through the health officer, in case it is absolutely necessary to employ this emergency supply. The well supply being apparently inadequate, the authorities were urged to take steps at once to enlarge and improve the supply obtained from this source.

One of the engineers visited Willoughby, where the water is being treated with calcium hypochlorite. It was found that, while the treatment is carefully attended to by the operator, an amount of chlorine was being used which was greatly in excess of the amount considered necessary for the treatment of waters which are not grossly polluted. Pending the results of the studies being carried on in our laboratory to determine whether or not the effect of this overtreatment is deleterious to the general health, the authorities were advised to obtain expert advice regarding the treatment of the water supply at Willoughby with a view to reducing, if possible, the amount of chemical used.

Analysis of samples of water from the sites selected by the authorities of Worthington showed that the water from the gravel deposits was better in quality than that from the shale formation, and it appeared advisable that the supply from the former be thoroughly investigated. The mayor was so notified.

In compliance with the second condition of the Board's approval of the proposed water supply for Malvern, the village clerk submitted an ordinance to be adopted by council for the protection of the supply, and the same was approved by the Secretary April 2nd, 1912.

SEWERAGE AND SEWAGE PURIFICATION.

One of the engineers visited Arlington Heights, Bremen and Salem to investigate proposed sewerage or sewage purification, and reports have been prepared for consideration at this meeting on proposed sewerage for Arlington Heights; modification of the plans for a sewage purification plant at Bellefontaine; sewers at Bremen; additional sanitary sewer at Hamilton and sewerage and sewage disposal for the Muskingum County Children's Home, near Zanesville.

Sewerage conditions at Cincinnati, Shelby and Upper Sandusky, and the purification plants at Galion and Mt. Gilead were inspected. The plants under construction at Louisville and Sebring were also inspected; and Belleville and La Grange were visited in regard to residential sewage disposal plants.

March 27th the chief engineer held a conference with the mayor and city engineer of Bellefontaine relative to the construction of the sewage purification plant. At this conference the necessity of completing the sludge filter before placing the plant in operation was made clear to the officials and the city engineer stated that it would be commenced as soon as weather conditions permit.

One of the engineers investigated the sewerage and drainage conditions at Forest. It was found that the village has, without the approval of the State Board of Health, installed several sewers for the removal of storm water and that these are receiving domestic wastes. The attention of the authorities was called to the requirements of the Building Code for proper method of disposal of sewage where sanitary sewers are not available, and council was advised to prohibit by ordinance the misuse of the storm sewers and cause the removal of all present connections to these sewers.

Without a water supply the amount of sewage produced in the village is small and sanitary sewers may not be necessary until such supply has been installed.

Recent inspection found the sewage purification plant at London to be in an unsatisfactory condition, with no improvement over its condition as found in 1910. Although a caretaker is employed it is evident

the plant is neglected. The authorities were notified that the failure of the plant to operate as designed, necessitates more frequent attention and that daily visits should be made to the plant for the purpose of adjusting the filters. They were also advised that the septic tank was badly in need of cleaning and that this should be done without delay. Other suggestions were made in regard to the operation of the plant.

While in Greenfield, one of the engineers learned that nothing had been done to comply with the provisions of the Building Code requiring that private vaults and cesspools shall be abandoned and connections made to the sanitary sewers, and that the misuse of the storm sewers had caused nuisances. The attention of the authorities was called to this matter.

The sewage purification plant at Marion was found to be in a run down condition and the secondary devices were not in operation, permitting the effluent from the septic tanks to pass directly to the effluent drain. For some years after the installation of the plant good results were secured, but for several months the plant has been overworked and neglected to such extent that repairs, enlargements and better methods of operation are necessary. The director of public service was urged to take immediate steps to make improvements at the plant, and, if necessary, to secure competent engineering advice.

Later Mr. Warner, city solicitor of Marion, called at the office and had a conference with the chief engineer and the Acting Secretary in regard to the plant. It was agreed that the engineer would go to Marion as soon as possible and make a personal inspection of the plant in company with the director of public service.

One of the engineers investigated nuisances at South Charleston caused by the use of storm sewers (built without the approval of the State Board of Health) for domestic wastes. The authorities were notified that these nuisances should be abated and, if necessary, by the construction of a properly designed system of sanitary sewers.

A nuisance at Warren was investigated but has not yet been reported upon.

The chief engineer held a conference in Toledo with Mr. Sherman, of the firm of Riggs and Sherman, consulting engineers, relative to the investigation of Swan and Ten Mile creeks.

One of the engineers visited Shelby in regard to the treatment of acid iron wastes at the Ohio Seamless Tube Company.

In all, 47 inspections have been made by a representative of the Board and 33 different places visited.

THE STATE INSPECTOR OF PLUMBING.

March 18th, the State Inspector met with the master and journeymen plumbers of Columbus, and March 20th, with architects and builders of Lima, and explained the provisions of the State Plumbing Code.

March 27th, the inspector met with the council of Toledo in regard to a pending ordinance for the licensing of plumbers.

Inspections were made by him at Chillicothe, Ironton, Lima, Ohio State University, Springfield and Toledo. He also reviewed plans for improvements in the plumbing in certain buildings, making necessary recommendations.

MAY MEETING.

COMMUNICABLE DISEASES.

Smallpox.

Since the last report, in April, 157 cases of smallpox have been reported in 9 counties, as follows: Athens, Nelsonville 30; York Township 10; Columbiana, East Liverpool 1; Hamilton, Cincinnati, 3; Hancock, Liberty Township 1; Madison, London 1; Miami, Tippecanoe City 1; Montgomery, Dayton 108; Paulding, Paulding 1; and Portage, Ravenna 1.

Smallpox was first reported in Dayton February 10th, and up to March 2nd, 15 cases had been reported. March 16th, a number of cases were reported at one of the parochial schools. April 8th the health officer telephoned that there had been a large number of exposures to smallpox in this school and there was a question concerning the diagnosis of several suspected cases of the disease.

The epidemiologist was sent to Dayton, examined these cases and pronounced the disease smallpox.

April 23rd, at the suggestion of Mr. Hill, Dr. Grube and the epidemiologist were requested to visit Dayton to investigate the continued prevalence of smallpox. A copy of the epidemiologist's report was sent to the health officer of Dayton.

Scarlet Fever.

April 16th, at the request of the health officer of Lodi and Harrisville Township, Medina County, the epidemiologist visited Lodi to investigate an epidemic of scarlet fever; and on April 20th he was sent to Butler, upon request of the health officer, to settle dispute in diagnosis of scarlet fever. His reports may be found on a subsequent page.

PUBLIC WATER SUPPLIES.

The following places have been visited by one of the engineers to investigate proposed water supplies: Canton, Magnolia, Malvern, New Concord, Scioto County Infirmary at Portsmouth, Worthington and Wilmington.

Reports have been prepared for consideration at this meeting on the proposed additional water supply for Canton; additional water supply

for Chagrin Falls; an increase in the water supply of Jefferson; proposed water supply and purification for The Provident Coal Company near St. Clairsville; and the proposed supply for the Scioto County Infirmary, Swanton and Worthington.

The water purification plants at Lorain and Marietta were inspected, and the existing water supply at Blanchester, Geneva, Hillsboro, Jefferson, Leesburg, Lynchburg and Wilmington was examined.

Upon examination, the water purification plant at Huron was found to be in good working condition and the analyses of the filtered water showed it to be safe for domestic use. At the time of the examination the lake water was not seriously polluted. The authorities were advised, however, that it was not possible to state what results are obtained when the raw water is not so satisfactory, and that other examinations of the plant will be made during the year. They were urged to arrange for the keeping of complete records of the operation of the plant in order to assist us in becoming familiar with the plant.

An examination has been made of the recently completed water purification plant at Port Clinton. Water from the Portage River was being used and analytical results of samples collected indicate that the effluent from the plant was insufficiently purified. The river water was at the time seriously polluted and the board of trustees of public affairs was urged to take steps to properly repair the lake intake in order that the river intake may be abandoned. When this has been done another inspection will be made.

The water purification plant at Youngstown was found to be operated at a rate greatly in excess of its capacity and the filters were found to be in need of repair. Analyses of the raw water indicated that it was badly polluted, although not so seriously contaminated as it becomes at times. In spite of the poor condition of the plant and the quality of the raw water, analysis of the effluent did not indicate a poor quality. This result, however, cannot be taken as an indication of the results which may regularly be expected.

The authorities were urged to take immediate steps to improve the water supply by repairing the present purification plant and enlarging the filtering capacity.

SEWERAGE AND SEWAGE PURIFICATION.

The special committee having the matter in charge, inspected the proposed site for sewage purification at Canton on April 9th.

Bremen was visited in regard to proposed sewerage; Bedford and Lakeside in regard to sewage and sewage purification, and the Lima State Hospital relative to proposed sewage purification.

The existing sewage purification plants at Chagrin Falls, Geneva, and Jefferson were examined, and the sewerage conditions at Wilberforce University investigated.

The sewerage system of Blanchester, Hillsboro, Leesburg, Lynchburg, Marietta, Pomeroy and Wilmington was inspected by one of the engineers.

Reports have been prepared for consideration at this meeting on enlargement of the sewage purification plant at Ashland, sewerage for Bedford, and sewerage and sewage purification for the Kirtland Farm near Poland.

April 18th, Mr. C. D. Crouch of Chicago, president of the Public Service Finance Corporation, and Mr. C. C. Benner of Akron, attorney for the company, conferred with the chief engineer and Acting Secretary regarding a proposed scheme for disposing of the sewage, garbage and other municipal wastes of Akron. They were advised that before an investigation could be made it would be necessary to have plans adopted by the city officials and presented to the Board for approval.

Salem was recently visited by one of the engineers to learn what progress had been made in the construction of a sewage purification plant and it was found that although the contract had been let the work had not been started. It was also learned that incomplete records are kept of sewer connections and the attention of the authorities was called to the importance of keeping accurate records of the location and nature of all sewer connections. It was also pointed out that owing to the construction of combined sewers the present system receives a large quantity of storm water and that this will undoubtedly be detrimental to the operation of the sewage purification plant. They were urged to take steps, so far as possible, to remove the storm water from the sewers by the construction of suitable storm sewers.

A report by one of the engineers upon an inspection of the sewage purification plant under construction at Sebring indicates that while the plant has been almost completed, a number of changes are necessary to properly complete the plant.

It was found that the concrete work had cracked; the embankments of the filters had not been sodded, resulting in the washing of clay onto the surface of the sand; an overflow from the main sewer in a manhole near the screen chamber is at such an elevation that a minor increase in the sewage flow will pass through it.

The mayor and council were told how to remedy these defects, and in order to prevent freezing in winter, they were advised to cover the screen chamber and siphon chamber and that in covering the siphons, a housing with windows to admit light should be provided. Also that gages for reading the weirs were necessary and that it would be advisable, to prevent the flow of the ditch receiving the effluent from backing up into the drains of the filters, to install a flap gate on the outlet.

NUISANCES.

March 12th, the board of health of Niles made complaint that the city of Warren was maintaining a large dumping ground in Howland Township, Trumbull County, about five miles northwest of the intake of the public water supply of Niles, and asked the Board to immediately investigate the conditions, believed to be detrimental to the health of the citizens of the city.

March 19th, one of the engineers made an inspection and prepared a report. It was found that the dumping grounds create a decided nuisance and are extremely objectionable to the residents in their vicinity. At the time of the visit, however, no evidence was secured to indicate the pollution of the water supply of Niles by the dumping grounds. It would appear, therefore, that these grounds must be considered as a public nuisance, detrimental to the people of that particular locality, which should be abated by the local officials. The clerk of the board of health of Niles was so notified. A copy of the letter to the health authorities was sent to the health officer of Warren, and he was urged to do all in his power to have council improve the conditions at the dumping grounds by providing more suitable means of disposal of garbage and night soil.

A nuisance has been investigated at Millersburg and will be reported upon later.

THE STATE INSPECTOR OF PLUMBING.

The State Inspector of Plumbing has made inspections at Defiance, Delphos, Lima, Tiffin and Toledo.

He addressed the council of Mansfield in regard to the advisability of appointing a local plumbing inspector; and met with the master plumbers of Dayton to explain the provisions of the State Plumbing Code.

His report may be found on a subsequent page.

Since the last report 32 places have been visited and 51 inspections made by a representative of the Board.

April 19th, the Attorney General was asked whether this Board has jurisdiction to prevent municipalities or individuals from using the streams of this state as a means of disposing of such refuse as may readily be disposed of by burning or by dumping on land without the creation of a public nuisance, that is, such refuse as boxes, brush, tin cans, bottles, etc., that in the classification of municipal wastes would come under the head of "rubbish."

Also the question raised by Mr. Hill at the Zanesville meeting on the arbitration feature of the Bense Act.

In accordance with the action of the Board at the last meeting, the health officer of Cincinnati has furnished information concerning the ability of the health department of that city to prepare the anti-rabic material furnished by the Public Health and Marine Hospital Service for

use in cases of persons bitten by animals suspected to have rabies, and a copy of this communication sent to the committee having the matter in charge, Mr. Hill and Dr. Grube.

A communication requesting the State Board of Health to take action to regulate the practice of manicuring and of giving of vapor baths, was received from the health officer of Cincinnati and transmitted to the members of the Board for consideration.

The offices of the Board and the Engineering Department have been moved into the Hartman Building, and the laboratory will be moved as soon as equipment can be installed. An order has been placed with the Industrial Department at the Mansfield Reformatory for book and storage cases and such furniture as will be needed to equip the new offices.

JUNE 19th MEETING.

COMMUNICABLE DISEASES.

Smallpox.

Since the last report, in May, 48 cases of smallpox have been reported in 13 counties. These were distributed as follows: Athens, York Township 3; Columbiana, East Liverpool 1; Cuyahoga, Cleveland 1; Franklin, Columbus 9; Hamilton, Cincinnati 1; Hancock, Findlay 1, Liberty Township 3; Hocking, Liberty Township 3; Ward Township 2; Jackson, Wellston 8; Lucas, Jerusalem Township 1, Toledo 1; Miami, West Milton 1; Montgomery, Butler Township 6, Vandalia 3; Seneca, Tiffin 1, and Williams, West Unity 3.

No inspections were made by the medical inspectors.

May 14th, at the request of a number of citizens, the epidemiologist visited Butler Township, Montgomery County, to investigate an outbreak of smallpox. His report may be found on a subsequent page.

Scarlet Fever.

An outbreak of scarlet fever occurred at Holloway, a village of about 800 inhabitants, in Belmont County. The council undertook the management of the epidemic, and the measures they suggested were somewhat at variance with those advised by the health officer who was serving in lieu of a board of health. There was also some question among the laity as to the correctness of the diagnosis. The epidemiologist went to Holloway May 4th, upon request of the health officer. His report may be found on a subsequent page.

May 27th, in company with Mr. Shirer of the State Board of Charities, Dr. Grube went to Dayton to inspect the site proposed for the location of the district tuberculosis hospital for Montgomery and Preble counties, and he is to present a report at this meeting.

BENSE PROPOSITIONS.

June 4th, the Assistant Secretary and the chief engineer went to Cincinnati to confer with the Engineering Committee relative to the disposition to be made of the Bense propositions now pending.

A resolution, adopted by the board of health of the city of Cincinnati on May 15th, 1912, has been received, complaining of the pollution of Mill Creek by the city and neighboring villages. This was referred to the Engineering Committee.

PROPOSED OR ADDITIONAL WATER SUPPLIES.

The following places have been visited by one of the engineers relative to proposed new or additional water supply: Alliance, Centerburg, Chagrin Falls, Lisbon, Magnolia, Pennsylvania Railroad at Mansfield, Navarre, New Berlin, New Concord, Portsmouth, Sandusky, Swanton, Sycamore, Wilmington and Worthington.

Reports have been prepared for consideration at this meeting on Lisbon, Navarre, New Berlin, Oberlin, Sandusky, Sycamore and Portsmouth.

May 20th, the city engineer and the consulting engineer for Portsmouth, came to Columbus to confer with the chief engineer and the Acting Secretary regarding improvements in the public water supply of that city, which comprise filtration.

Centerburg. An informal report on the examination of the test well for proposed water supply for Centerburg states that the well has not given evidence of furnishing an adequate supply, that the quality of the water is safe for domestic use, although objectionable on account of the very high iron content, and that before adopting this well as a source of water supply, the village should consider from a financial standpoint the feasibility of installing an iron removal plant.

New Concord. Examination of samples from dug well No. 3 in the valley of Crooked Creek, proposed as a source of public water supply for New Concord indicated that the water is of satisfactory quality and contains but slight evidence of organic contamination. The iron content is high enough to cause complaint on account of staining of plumbing fixtures. The authorities were informed that it would be necessary to treat the water for the removal of the excessive iron and if they desired to use this supply it would be necessary to make extensive tests to determine the available yield and to have complete detailed plans prepared and submitted to this Board for consideration and approval.

Wilmington. An informal report made on the examination of the site for proposed additional water supply for Wilmington states that this property (the Hunnicott farm) is included in the territory approved by the Board in 1907. The water is satisfactory from a sanitary stand-

point, but contains an excessive iron content which will undoubtedly cause general complaint and its removal will be required. The Wilmington Water and Light Company was notified of these facts.

In accordance with instructions, to make frequent inspections of the existing water supply at Wilmington, the engineer made an examination and reports that the public water supply wells are furnishing a water of satisfactory quality from a sanitary standpoint. Analysis showed the water from the infirmary well to be of good quality.

EXISTING WATER SUPPLIES.

One of the engineers inspected the existing water supply at Barnesville, Lancaster, Malta, Mingo Junction, New Comerstown, New Lexington, Plymouth and Wooster; and the purification plants at Bellaire, Rocky River and Waverly.

Blanchester. Examination revealed the fact that no improvements have been made during the past few years in the water supply of Blanchester. Practically the same conditions exist that were found upon examination in 1908. Analysis of samples from the Whitacre Run Reservoir indicated a water of unsatisfactory quality for a public supply. The supply is not used to any great extent for domestic purposes, owing largely to its unsatisfactory physical characteristics. Private shallow dug wells, poorly located as regards sources of pollution, are in general use. Examination of one of these wells, which is quite extensively used, revealed the fact that the water had received considerable sewage pollution. Passage through the soil and gravel, however, had purified it to such an extent that the sample analyzed indicated a water satisfactory for use. The health officer was advised that it may not remain so, and that this water should be looked upon with suspicion, and the necessity of securing a new water supply of satisfactory quality was urged.

Delaware. In the recent examination made of the water supply of Delaware, analyses of samples from a group of wells in the valley of the Olentangy River indicated a water of good quality from a sanitary standpoint. The supply is, however, inadequate and it will be necessary to augment it, probably this summer. It was noted that the valve on the emergency intake in the river was unlocked. The attention of the water company was called to the provision of this Board's approval requiring that the health officer "be empowered to place locks or seals upon the valves admitting the old supply into the pumps". A letter was also sent to the health officer of Delaware urging him to place a seal on the valve through which the emergency supply is drawn.

Hillsboro. Examination showed no recent changes made in the method of obtaining or handling the public water supply at Hillsboro. It was learned that in the fall of 1910 it was necessary to pump water from the creek to supply the consumption, and it is evident that the

available supply from wells should be increased by extension. Analyses of samples taken from the pumping station, and at a point on the distribution system, indicated that the water obtained from the wells is of good quality from a sanitary standpoint, though it contains a high iron content. This is removed to a great extent by storage in the standpipe, and the authorities were advised that attention should be given to the frequent removal of the deposits in the standpipe; that the inefficient method of cleaning by flushing should be abandoned and the standpipe properly cleaned by draining it, when necessary.

Leesburg. The existing supply at Leesburg was examined. Analyses of samples from a hydrant indicated a water of satisfactory quality from a sanitary standpoint. A sample taken from the Huff Spring was of unsatisfactory quality, due, no doubt, to local contaminating influences.

Lynchburg. Recent examination of the water supply at Lynchburg showed that no changes had been made in the method of securing or handling the supply. The wooden curbings and coverings of the various wells were found to be in need of repair and the board of trustees of public affairs was advised that these should be replaced immediately by substantial structures. Water from a small stream near the pumping station had been used at various times as an emergency supply without the knowledge of the health officer and no warning given the consumers to boil the water at such times. Attention was called to the danger in such practice and the authorities were advised to abandon the emergency supply as the springs and wells appear to be of adequate capacity to supply all needs of the village. The results of analyses of water from Sulphur Springs and the well supplying it, indicate that the water is of satisfactory quality from a sanitary standpoint and suitable for general domestic use.

WATER PURIFICATION PLANTS.

The water purification plants at Ashtabula, Geneva, Lorain, Marietta, Niles, Sandusky, Upper Sandusky and Warren have been reported upon.

Ashtabula. An informal report was made and furnished the Ashtabula Water Company. The report showed that at the time of the examination good results were obtained from the operation of the plant. The water produced was satisfactory from a sanitary standpoint and suitable for domestic use. Attention was called to the fact that the location of the water works intake is such that with easterly winds the raw water may be contaminated seriously by pollution carried by the Ashtabula River and that great care should be exercised in the proper operation of the plant and some means of analytical control should be installed in order that changes in the character of the raw water may be readily detected. Attention was also called to the importance of maintaining accurate records of the operation of the plant, including ana-

lytical observations, quality of the water filtered, quantity of coagulant used and other details of operation.

Geneva. The report upon a recent inspection of the water purification of Geneva indicates that while the plant is giving good results there are a number of improvements required. The authorities were urged to take under consideration the present unstable condition of the water works dam, and the possibility of its failure, which would result in a shortage of the water supply, and to repair the same, or, more preferably, provide a new dam. They were also advised that analyses of the samples indicated that while the filters were giving good bacterial efficiency, they were passing a water which was slightly turbid, indicating the danger that at times the efficiency may be insufficient. The cause of the turbidity is not definitely known, but is likely due to the presence of dead spots, caused by deposits of clay, in the filtering material which are not removed by the present method of washing employed, and which caused greatly increased rates to prevail in other portions of the filters. A rate controller should be provided by which the head under which the filter is operating, as well as the rate of filtration, may be controlled. The dead spots should be prevented by providing additional sedimentation capacity and by agitating the sand during washing.

Lorain. Typhoid fever was prevalent in Lorain during January and February, and it was believed by some of the citizens that the water was not being properly purified, and was the cause of the fever. Upon request of the health officer one of the engineers visited Lorain, examined the water purification plant, and a report was made and furnished the director of public service. The examination indicated that the plant was working at good efficiency and producing a satisfactory effluent. The analytical results, however, indicated that a larger amount of alum was being applied to the water than was stated by the analyst in charge of the plant. He was advised to closely watch this feature of the operation of the plant in order to prevent overtreatment. A small hypochlorite treatment plant has been partially installed, although no bleaching powder has as yet been used. Attention was called to the requirement that detailed plans of the installation be submitted to the State Board of Health; and also to the importance of keeping complete records of the operation of the plant. The old filter plant has been entirely abandoned. It was suggested to the authorities that it might be advisable to provide a connection by means of which the old plant would be available should an emergency arise.

Marietta. A complete examination has been made of the water purification plant at Marietta. It was found that the plant is being operated in a satisfactory manner and producing good results. The raw water in the Ohio River was rather turbid and contained sewage pollution. Analyses of the filtered water showed that the effect of sedimen-

tation, filtration, and sterilization produced a water of good quality for domestic use.

It was learned that the hypochlorite treatment has been in use for about three years, and that good results are now obtained in the treatment. The authorities were urged to have particular care taken to avoid overtreatment of the water. Inasmuch as the chemical is applied with lime, it would appear that fluctuations in the application of the latter chemical would produce undesirable fluctuations in the hypochlorite treatment, which may be avoided by intelligence in preparing the solution. The apparatus used for the preparation and application of the alum is in a poor state of repair and the authorities were advised that it should be entirely replaced. A copy of the analytical results obtained by examination of samples of the water and coagulant collected by our engineer was furnished to the director of public service and the superintendent of water works.

Niles. Examination has been made of the recently completed water purification plant at Niles. The engineer's report indicates that the plant has been well constructed and in accordance with the plans approved. Two defects in construction were noted—a failure of several of the tie beams of the coagulating basins, and the improper operation of the loss of head gages and rate controllers on the filters. With these devices out of commission there is danger of the filters being operated at excessive rates and a poor efficiency obtained. The director of public service was notified to have these defects corrected as soon as possible, and also that means should be provided for analytical control of the operation of the plant; that a competent analyst should be employed and a well equipped laboratory provided so that daily examinations of the raw and filtered water may be made and observations taken to determine the proper chemical treatment.

At the time of the examination the Mahoning River was at medium high stage and the water was carrying considerable sediment and organic matter, and there were indications of sewage pollution. The plant was producing an effluent that was generally satisfactory, although samples from two of the filters showed the presence of intestinal organisms, possibly due to the excessive rate of filtration made possible by the failure of the rate controllers. Another examination will be made when the plant has been placed in perfect working order.

Upper Sandusky. The plant at Upper Sandusky was found in a somewhat rundown condition and in need of repairs and greater care in its operation. An informal report was furnished the superintendent of water works with a letter in which the following facts were emphasized: Better means of applying the coagulant should be provided. With the outfit used at present a wide fluctuation occurs in the amount of alum applied, and there is no means of accurately determining the chemical treatment. A box for dissolving the alum and an additional

solution tank should be added. Only two of the three filters were in a condition to use and in these the filtering material was found to contain balls of clay which should be removed. Probably it will be found necessary to replace the filtering material. The analytical results also indicated a large leakage of ground water into the clear well. The walls of this well should be made watertight to prevent possible contamination of the purified water. The clear well should also be covered with a substantial roof. Records of the operation of the plant should be regularly kept.

Warren. The results of recent examination of the water purification plant at Warren indicate in general that the plant is giving excellent results and producing an effluent which is entirely satisfactory. Several defects were noted, however, which should be remedied, namely, the alum feed is regulated by means of the old device supplemented by direct application from the solution tank through an orifice. The Trumbull County Service Company, having control of the plant, was advised that this is an inaccurate control and should be replaced; that the hypochlorite feed is not sufficiently accurate and that when this chemical is used it should be applied at a constant rate by means of an orifice operating under constant head or other suitable device; also that the clear well should be covered to avoid accidental contamination. (They replied immediately that the changes suggested would be carried out as soon as possible).

Youngstown. An examination and report has been made of an experimental apparatus for the treatment of water by anhydrous chlorine at Youngstown. The report states that the use of anhydrous chlorine as an agent for the purification of water will eliminate many objectionable features incident to the use of hypochlorites for sterilization purposes: That the anhydrous chlorine is effective in purifying water and its use under proper control will be a decided advantage over the older methods of sterilization. The control of the present apparatus, however, is unsatisfactory in that it is not possible to measure accurately the quantity of gas applied to the water. Samples of the treated water to which the starch iodide had been added gave a blue color at all times, indicating the presence of chlorine in an unstable form in the water. No tastes or odors were noted at any time. The bacterial results showed a reduction in the total number of bacteria and the absence of bacteria of an intestinal origin in all samples collected. The raw water, however, was also free from intestinal organisms.

SEWERAGE AND SEWAGE PURIFICATION.

The following places were visited by one of the engineers relative to proposed sewerage or sewage purification: Bethesda, Bowling Green (State Normal School), Cambridge, Chicago Junction, Dayton (District Tuberculosis Hospital), Dover (Cesspool for Masonic Temple),

East Palestine, Linden, Marysville (Woman's Reformatory), Mt. Vernon, New Philadelphia, Ohio City (School), W. Toledo, Zanesville (residential plant).

Reports have been prepared for consideration at this meeting on sewerage for Bryan, Canal Dover and Chicago Junction.

Cleveland. June 11th, the chief engineer went to Cleveland to confer with the special committee appointed at the last meeting of the Board to consider sewerage conditions in that city. Locations for proposed sewage purification works were inspected.

Dayton. June 6th, the chief engineer visited Dayton to inspect the site proposed for the location of the District Tuberculosis Hospital for Montgomery and Preble counties. His examination indicated that the problem of the proper disposal of sewage from the institution is rendered extremely difficult by the lack of a sufficiently large stream near the site, and the design of the works for the purification of the sewage, therefore, must be the result of study on the part of an expert sanitary engineer. The board of trustees was advised to spare no expense in securing the services of a competent man for this work, and it was also urged that an architect be employed who is experienced in the design of tuberculosis hospital buildings.

Marysville. In company with the auditor of state and the secretary of the state board of charities, members of the board of commissioners of the Ohio Reformatory for Women, and Mr. George S. Mills, architect, the chief engineer visited the site proposed for the location of the institution near Marysville, the commissioners wanting advice in regard to the proper disposal of the sewage from the institution.

Considering the location available for the plant and the necessity for securing a high degree of purification at all times, our chief engineer was of the opinion that it would be more desirable to secure a connection with the Marysville sewers, and the commissioners were informally advised to secure, if possible, the co-operation of the village in constructing a sewer to or through the corporation.

Bremen. In April plans for a proposed system of combined sewers for Bremen were disapproved by the Board and the village was asked to have prepared and submitted plans for a comprehensive system of sanitary sewers. May 3rd, a delegation from Bremen, consisting of two councilmen and the village engineer, came to Columbus for a conference with the chief engineer. They claimed that funds are not available for the construction of a separate system and that storm sewers for the drainage of surface water are necessary, especially as it is the intention to pave a number of the streets.

The proposed revision of the plans constitutes an improvement over the plans disapproved, but the requirement that sanitary sewers be constructed in place of combined sewers is not being followed.

EXISTING SEWERAGE AND SEWAGE PURIFICATION PLANTS.

The existing sewerage at Dexter City, Fostoria, Lancaster, Malta and Mt. Vernon; and the disposal plants at Jackson, Lakewood, Mansfield and Orrville were inspected. The purification plant under construction at Alliance was examined and sewerage conditions at Bryan, Canal Dover, Geneva-on-the-Lake, Kenmore and Payne investigated.

Marble Cliff. It was learned that the officials at Marble Cliff were permitting connections of cellar drains, cistern overflows and other sources of ground and surface water to the sanitary sewer system. Their attention was called to the undesirability of permitting these connections and of the deterioration of the purification plant which is bound to result from such misuse of the sanitary sewers, and they were urged to enforce proper legislation to prevent such misuse of the sanitary sewers.

Payne. One of the engineers investigated sewerage conditions at Payne in answer to a request. He found that funds have been provided for the installation of a water supply but the improvement has not been made, the question arising as to whether the installation of a water supply will not necessitate improvements in sewerage conditions. The use of the public water supply for general domestic purposes will no doubt require proper sewerage. The storm sewers installed are unsuitable for receiving domestic wastes and ultimately sanitary sewers will be required. The disposal of domestic sewage will necessitate a purification plant as Flat Rock Creek is too small to receive the untreated sewage during dry weather. The authorities were urged to not delay installing a public water supply on account of the future necessity of providing sewers, as the public water supply will assist in the general improvement of sanitary conditions in the village.

Pomeroy. Upon investigation it was found that the village of Pomeroy is provided with an inadequate system of sewers and that those which have been built are improperly constructed, and create nuisances. The attention of the authorities was called to the importance of improving conditions and they were advised that competent sanitary engineer be employed to design a comprehensive system of sanitary sewers in order that all sewers to be constructed in the future may follow a logical plan, and that the village is especially in need of a main sanitary sewer to be constructed in Sugar Run to intercept the sewage at present discharged into that water course.

Wilmington. Upon a recent visit to Wilmington one of the engineers found that nothing had been done towards the development of the plans for sewage disposal plant approved by the Board in November, 1911. The health officer stated that the Board of Health and council were in favor of sewerage. Sewage and other wastes are discharged into a branch of Lytle's Creek. This creek has such a small flow that any

proposed system of sewers for the village must be accompanied by a sewage purification plant.

Chagrin Falls. An inspection was made of the sewage purification plant at Chagrin Falls and it was learned that the plant had but recently been placed in operation after lying idle several months. The sewage from the sedimentation tanks was flowing continuously through one of the contact beds and on to the sand filters, and the time siphons, to control the discharge of contact filters and the dosing of the sand filters, were not in operation and are in need of repair. The authorities were advised to notify the manufacturers immediately, so that they might examine the apparatus and repair same.

The effluent from the sand filters was not flowing through the effluent drain but was leaving it filter through a crack in the concrete wall, indicating that the underdrains were clogged. A thorough inspection of the underdrains was suggested. The sludge from the sedimentation tank was disposed of by flushing it into the small stream near the plant. The authorities were advised that a sludge filter should be provided.

Geneva. Upon recent inspection of the sewage purification plant at Geneva, the engineer found that improvements are being made by the removal of a portion of the filtering material and reconstruction of the underdrains. The filtering material, as shown by the excavations, however, is of very poor grade, and it is probable that entire replacement in all the filters will be required. It was also noted that the area of the existing filters is insufficient to properly treat the sewage flow of the village and additional filters should be installed, and that the capacity of the pumping plant for lifting the sewage to the filters is not sufficient with the increased flow. A plant of greater capacity is needed. The attention of the authorities was called to these facts and they were advised to secure the advice of a competent sanitary engineer in preparing plans for reconstruction of the plant.

Jefferson. Although the sewage purification plant at Jefferson has been in operation less than a year it was not found in as good condition as would be expected. The concrete work on the cover of the sedimentation tank and dosing chamber is deteriorating and it may be necessary to replace this in the near future. The filters have suffered by the admission of storm water to the sanitary sewers at times when they were opened for making house connections, and also by the flooding of surface water from the elevated ground west of the plant. The authorities were advised to take immediate steps to correct the drainage from this direction by diverting it in a suitable trench; and to thoroughly clean the filters and relevel the surface. They were also advised that it would be well to have additional distributors designed by an engineer; otherwise the filters may deteriorate as a result of the unequal distribution.

Louisville. The sewage purification plant at Louisville has been practically completed. When inspected by one of the engineers a num-

ber of necessary alterations and repairs to place the plant in perfect working condition were noted. These were pointed out to the authorities and they were advised that they should secure the services of an intelligent and reliable caretaker to attend to the proper operation of the plant, daily visits to be made to see that the various devices at the plant are working properly. A copy of this letter of advice was sent to the consulting engineer, who was asked to furnish complete plans, those on file being of an incomplete nature.

Mt. Gilead. The sewage purification plant at Mt. Gilead was found to be in need of attention. The sedimentation tanks are badly in need of cleaning, as at the time of inspection considerable suspended matter was being carried to the surface of the filters. The filters were found to be ponded and should be cleaned and repaired; and the distributors are in poor state and should be replaced. The authorities were advised of these facts and were also urged to sod the embankments and to keep accurate records of all connections made to the sewers.

Wilberforce University. The purification plant at Wilberforce University, near Xenia, was found to be giving better results than at any time since its installation. It was urged that the present efficient care of the plant be continued in order that it may be maintained in the best possible working condition. Reconstruction of a portion of the sewer system is contemplated, which improvement will provide better drainage of the buildings and if carried out in accordance with good engineering practice, will constitute a benefit to the institution.

The proposed locations for sewage purification works for the Kirtland Farm near Poland, received May 6th, 1912, from Mr. R. Winthrop Pratt, consulting engineer, were referred to the engineering committee at the last Board meeting, with power to act. The Committee took the following action, and the Realty Security Company of Youngstown, owners of this subdivision, were so notified May 10th, 1912.

1st. To disapprove Site A. as a location for sewage purification works;

2nd. To approve Site B. as a location for sewage purification works providing a plant including intermittent filters for final treatment be installed; and,

3rd. To approve Site C. as a location for sewage purification works providing a plant including intermittent filters or contact filters for final treatment be installed.

The chief engineer on May 13th, 1912, approved plans and specifications for a sewage disposal plant for the residence of Edwin C. Shaw, near Akron.

NUISANCES.

Investigations of nuisances have been made at Dexter City, Dover, Cuyahoga County; Grand Rapids, Malta and New Lexington.

Dexter City. The president of the council made complaint of the condition of the village of Dexter City. One of the engineers visited the village and found it to be in a very uncleanly condition, a general carelessness in the disposal of garbage and other wastes prevailing. The complainant was advised that the local authorities should take immediate steps to improve the general appearance as well as the sanitation of the community; that the connection of an overflowing cesspool to a tile drain is in violation of the law and the owner should be made to remove it by authority of the health officer.

Dover and Grand Rapids have not yet been reported upon.

Malta. Complaint was made of a nuisance at Malta caused by the removal of offal, hides, etc., (that had accumulated during the past five years), from a tannery to a small hollow which is also a dump for the surface drainage of the tannery and public dump. The decomposition under a strong sun gave rise to very offensive odors, which, it was claimed, compelled the people of the neighborhood to keep their doors and windows closed. The local board of health had been appealed to but had failed to act in the matter. The tannery is owned by The Geo. Hoffman and Son Tannery Company, and has stood in its present location since 1859. The proprietors stated that no additional offal would be deposited in the present location, but would be sold and shipped whenever a car load accumulated. A report was made and sent to the complainant and to the attorney for the tannery company, in which three ways for preventing the nuisance in the future were mentioned; the first by dumping the offal at a suitable location; second, by burial, or third, by incineration. It was also stated that existing conditions might be improved by the use of a sufficient quantity of quick lime applied to the surface of the decomposing material. As a new building is to be erected they were also advised that the decomposing material might easily be covered with earth from the excavation.

Millersburg. The Board was asked to investigate a nuisance at Millersburg caused by the stables of the H. B. Snyder Sons Co., shippers of horses. One of the engineers visited this village, made an investigation, and a copy of his report was sent to the mayor. The report indicated that a nuisance is undoubtedly created at times by this stockyard and shipping station in the western part of the village close to habitations in the built up portion of the village and that abatement of the nuisance is within the province and duty of the local health officials. The village has been without a health officer for some months and the mayor was urged to appoint a competent man for this position, preferably a physician.

New Lexington. The Board was asked to investigate a nuisance at New Lexington caused by the discharge of sewage through a storm sewer into a ditch north of the central portion of the village, which flows to Little Rush Creek. One of the engineers visited New Lexington and

found that the principal connection was from the Sheeran Drug Company's building, which cannot be abandoned without serious inconvenience to the owners inasmuch as there is not available room for the construction of a cesspool or private disposal plant. The health officer was advised that the abatement of the nuisance created can be permanently accomplished only by providing sanitary sewers, and that the necessity of a complete system of sanitary sewers will soon become felt in other portions of the village as a result of the recent installation of a public water supply. He was also advised that, pending the construction of sanitary sewers, the nuisance might be abated by sewerage of the ditch complained of from the present outlet to Little Rush Creek. The abatement of this nuisance is within the power of the local authorities.

Sunbury. An examination was made of the creamery waste disposal plant at Sunbury; and while in Orrville, one of the engineers had a conference relative to the disposal of the creamery wastes from the Cottage Creamery Company's plant.

One of the engineers has made a general inspection of the Scioto River watershed.

THE STATE INSPECTOR OF PLUMBING.

Inspections have been made by the State Inspector of Plumbing in Columbus, Clyde, Dayton, Jackson Township, Fayette County, Grand View Heights, Lima, Springfield, Toledo, Urbana, Washington C. H., Wauseon and Zanesville. Forty-five inspections were made and changes recommended where necessary.

April 30th, the Inspector attended a conference of plumbing inspectors of Ohio, held in the Columbus City Council Chambers, and addressed the master plumbers at Springfield and Zanesville, explaining the provisions of the State Plumbing Code.

Plans were reviewed for plumbing in a High School building at Martinsville, the Montgomery County Infirmary buildings at Lima and Springfield.

Reports have been prepared on inspection of the Ohio School for the Blind, with recommendations for improvements; and on the inspection of the Ice Cream Parlor and Confectionery located in the Judy Building, Washington C. H., also, in compliance with instructions the Inspector submitted a statement relative to the use of "mild or soft steel pipe" in place of "wrought iron" for connecting sanitary apparatus in plumbing work.

Copies of these were sent to the Engineering Committee.

The report of the Inspector will be found on a subsequent page.

Since the last report 121 inspections have been made by representatives of the Board and 79 places visited.

ATTORNEY GENERAL'S OPINION.

The Attorney General has given an opinion to the effect that the State Board of Health is without authority to prevent either the publication or the circulation of the book prepared by H. J. Luff, of Cleveland, containing misrepresentations in regard to the interpretations of the State Building Code, and claiming to have the approval of the State Board of Health of certain appliances in which he is financially interested.

The Attorney General advises that the Board cite Mr. Luff to appear before it and point out to him the evils which might result from the sale of his book on account of the misrepresentation therein, and, if he still insists upon continuing such publication and sale thereof, that the Board give notice to the public of such misrepresentations contained therein by giving notice to all architects, builders and parties amenable to the law.

The question of the arbitration feature of the Bense Act was submitted to the Attorney General and he has stated, informally, that he is of the opinion that this feature is not only constitutional but essential to the satisfactory enforcement of the act.

In accordance with instructions at the last meeting, the attention of the mayor and council at Newark, and at Hamilton, was called to the provisions of Section 4404 of the General Code, relative to the establishing of a board of health.

June 8th, we were notified that such a board had been duly organized at Newark, and that Dr. W. H. Knauss, the former health officer, had been reappointed.

JULY MEETING.

COMMUNICABLE DISEASES.

Smallpox.

There have been but ten cases of smallpox reported, one in Cincinnati, one in Dayton, six in Toledo and two in Tiffin. This is the smallest number of cases of smallpox reported to the Board within the past fourteen years.

Typhoid Fever.

June 14th, at the request of the health officer, Dr. F. V. Miller, the epidemiologist investigated an outbreak of typhoid fever at Delaware. His report may be found on a subsequent page.

SENSE PROPOSITIONS.

A petition has been received from the Board of Health of Cass Township, Richland County, complaining of the contamination of Black Fork Creek and the sewage filter beds by the sewage of Shelby.

The special committee, Dr. Hasencamp and the chief engineer, Mr. Dittoe, on June 29th, investigated the pollution of Sibley Creek at Toledo; complained of by the board of health of Washington Township, Lucas County. A report is to be presented at this meeting.

Pursuant to instructions, the Cleveland authorities were cited to appear before the Board at this meeting.

The Ironton authorities were also instructed to present to the Board at this meeting a definite plan for the improvement of the public water supply of that city; and notice has been received that representatives of the city will be present.

The authorities of Dayton were also notified that the Board would expect them to lay before the Board at this meeting all desired information and plans for the improvement and enlargement of the public water supply of that city. The director of public service has signified his willingness to furnish all the information desired and has instructed the city engineer to furnish same to the Board.

In accordance with instructions received at the June 19th meeting, the director of public service of Cincinnati was asked to furnish a statement relative to the steps now being taken to improve Mill Creek, for presentation at the next regular meeting of the Board. July 3rd, a communication was received stating that the department of engineering of the city of Cincinnati has started a survey of the city, which will include an underground survey as well as a topographic survey, so that the entire situation can be studied and a comprehensive plan suggested for the improvement of Mill Creek, as well as the entire situation at Cincinnati. The territory to be covered and data to be compiled is considerable, but the department expects to have the report completed by the fall of 1913.

On June 27th, in accordance with instructions, a copy of the resolution adopted by the Board at its June 19th meeting, in regard to the investigation of wastes disposal, was forwarded to the Hon. James Wilson, secretary of the Department of Agriculture. In acknowledgement the secretary stated that the matter was more closely allied with the work of the United States Public Health and Marine Hospital Service, and that he had referred the Board's communication to the Secretary of the Treasury.

PROPOSED AND ADDITIONAL WATER SUPPLIES.

Twinsburg was visited by one of the engineers to investigate a proposed water supply to be installed by a private company; Struthers and Swanton in regard to proposed additional water supplies, and Youngstown relative to the enlargement of their filter plant.

Reports have been prepared for consideration at this meeting on East Youngstown and Struthers; Swanton, and Twinsburg.

EXISTING WATER SUPPLIES.

The existing water supply has been investigated by one of the engineers, at Athens, Canal Dover, Chillicothe, Fremont, Hamilton, Hudson, Lima, Sidney, Steubenville, Troy, Wellston and Westerville.

A general examination of the Lima water supply revealed the fact that no improvement has been made. The quality of the water is unsatisfactory, and the attention of the authorities was again called to the necessity of comprehensive improvements in the method of obtaining the supply and furnishing it to consumers, and to the importance of taking steps to furnish a potable water, suitable for domestic use. To this end they were urged to at once engage a competent sanitary engineer to make a study of the present supply and recommend the proper method to be followed in improving it. Their attention was also called to the presence of great numbers of fish in Lima Lake, which not only interfere with the proper effect of sedimentation but also impart to the water an objectionable taste and odor.

One of the engineers visited Mingo Junction to examine Potter Spring with reference to its suitability as a source of water supply. The board of health has been advised at various times to protect this spring from contamination. While it does not afford advantages as a source of public water supply, owing to its location it will probably remain in use for domestic purposes. Recent analysis indicates that there is considerable pollution, which has, however, been rendered harmless by passage through the soil, but with increasing pollution the purification may not be complete and the supply may become contaminated. The health officer was therefore reminded of the necessity of protecting this spring.

It is understood that the franchise of the water company will expire within a year or two and inquiry was made as to what steps are being taken by the local officials toward securing an improvement in the present water supply.

A report has been made upon the examination of the public water at Newcomerstown which indicates that the water is of satisfactory quality and safe for domestic use. The report states there is danger that the wells may receive pollution reaching the gravel deposits from

privy vaults located near the wells. The attention of the authorities was called to this danger in 1907 and they were advised to reconstruct several of the vaults in the neighborhood of the wells and provide watertight receptacles at or above the surface of the ground, and as soon as possible construct a watertight sewer to drain all dwellings in the vicinity. This advice was not carried out, and the board of trustees of public affairs has been reminded of the advisability of immediately safeguarding the water supply by making necessary improvements.

Sewerage conditions were also reported upon and it was recommended that the village of Newcomerstown engage a competent engineer to prepare plans for sewerage.

The examination of the public water supply at Plymouth indicated that the water is entirely unfit for domestic use, there being marked evidence of organic pollution in samples of the water analyzed in our laboratory, intestinal organisms being present in each sample. The attention of the authorities and of the water company was called to the necessity of improving the quality of the supply.

An examination has been made of the existing water supply at Wooster. Though disapproved by the State Board of Health in 1897, the city installed a water supply from Apple Creek, which has been used continuously since that time. This supply is of entirely unsatisfactory quality but supplies a large portion of the city. In 1910 and 1911 the so-called Bloomington wells were drilled, without consulting this Board. This supply is satisfactory from a sanitary standpoint, but is inadequate and storage in the Bloomington reservoir causes its deterioration on account of algal growths which produce tastes and odors. It was found upon examination that the supply furnished to consumers is a mixture of the two. The authorities were advised to clean the reservoir from the luxuriant algal growths at once, and they were urged to employ a competent sanitary engineer to make a comprehensive study of the water supply situation with a view to securing a permanent adequate supply of good quality.

EXISTING WATER PURIFICATION PLANTS.

The water purification plants at Dennison and Jefferson have been reported upon.

It was found upon inspection of the water purification plant at Dennison that the rate of filtration was excessive owing to the fact that the effluent valve had been opened almost to its fullest extent. The water company was advised that a suitable rate controller is needed to prevent this, and that a loss of head gage would also enable the operator to know when the filter requires washing. A complete examination of the plant will be made in the near future.

The water purification plant at Jefferson was found to be producing a water of good quality from a sanitary standpoint. At the time

of examination Mill Creek was at high stage and the water was turbid and rather soft. The coagulant was being applied in an amount equivalent to 4 grains per gallon and the alkalinity results indicated that this amount was excessive. There was an unaccountable increase of iron in the filtered water, which may have been due to some action of the impurity of the alum upon the strainer system in the filters. The authorities were advised, after plans have been made by a competent engineer, to install suitable apparatus for applying small quantities of lime to the raw water at times when there is a high stage in the stream in order to provide means of proper coagulation. It was also noted that the control boxes, through which the filtered water flows from the filters, had not been covered, as provided for in the conditions of approval, and attention was again called to the necessity of such covers to prevent contamination of the filtered water.

Upon request of the health officer, the water purification plant at Rocky River was examined.

The general results of the examination showed that the plant was not giving entirely satisfactory results. Analyses showed the raw water to be considerably polluted, and the filtered water did not show a marked improvement. The causes for the inefficiency of the plant include the inaccurate control of the application of the alum; an unsatisfactory period of sedimentation, and the absence of suitable controlling devices on the filters. The coagulant itself was of satisfactory quality and if properly applied should produce good results. Though a new intake was recently installed, with the idea of improving the water supply, the plant as operated cannot be considered capable of producing a suitable water, and the health officer was advised to warn consumers of the danger of using the water without boiling. The water company was also notified of the results of our examination and advised to make necessary improvements.

SEWERAGE AND SEWAGE PURIFICATION.

East Palestine was visited to inspect a site proposed for a sewage purification plant; Mt. Vernon, relative to proposed sewerage, and Reynoldsburg relative to sewerage and sewage purification for the State Serum Farm.

Reports have been prepared for consideration at this meeting on revised plans for a proposed system of combined sewers at Bremen addition to sewage purification plant at Alliance; sewerage for Mt. Vernon; and sewerage and sewage purification for the State Serum Farm; for an extension of time in the approval of proposed sanitary sewers for Arlington Heights; and on sewerage for District No. 3, Canal Dover.

The location for a sewage purification plant for Cleveland, south of the city and east of the Cuyahoga River, was visited by the special committee, June 28th.

EXISTING SEWERAGE AND SEWAGE PURIFICATION.

The sewage purification plant at Clyde; existing sewerage at Hudson, and sewerage under construction at Pleasant Hill, were inspected by one of the engineers.

The bank of sand from which the filtering material for the Salem sewage purification plant is to be furnished was also inspected.

The sewage purification plant at Mansfield was found to be in poor condition, and not operated in an entirely satisfactory manner. The contact filters have become badly clogged, due to excessive storm flow reaching the plant, and the applied sewage ponds at the surface, preventing the proper aerating action within the filters. The filtering material is poor and the authorities were notified that a large portion of it should be removed and replaced. It was learned that the authorities contemplate removing the storm sewer connections from the intercepting sewer, which improvement will relieve the sewage purification plant.

A report made of an inspection of the sewage purification plant under construction at Alliance, indicates that the plant as a whole has been well built and is nearing completion. It was found that the ventilators placed in the final intermittent filters extend but a few inches above the level of the filtering material, the intention apparently being to use these ventilators as overflows in event of the failure of the filters to pass the sewage. The authorities were notified that the ventilators should not be used in this way and to prevent by-passing of unpurified sewage they should be carried to an elevation higher than the walls of the filters. They were also advised that the distributors installed to apply the sewage to the final filters will probably not furnish sufficiently uniform distribution to prevent overworking of certain portions of the filters.

Sewerage conditions at Kenmore were investigated by one of the engineers, who found a nuisance is being caused by a sewer discharging into an open storm water ditch. This sewer receives sewage from a number of residences along its course. It was learned that it is the intention to construct watertight cesspools, the overflow from which is to be conducted to the sewer. This would be in violation of the provisions of the Ohio Building Code and the authorities were notified that they should not permit it. The necessity of sanitary sewers to provide proper drainage facilities for the residences was pointed out and they were urged to employ a competent sanitary engineer to design a system of sewers with sewage purification.

An examination was made of existing sewerage conditions at Lancaster. It was learned that there are about fourteen miles of combined sewers discharging into the Hocking River at eight or more outlets. No comprehensive plan of sewerage for the entire city has been followed. Attention was called to the fact that the city officials have been lax in submitting plans for sewers to this Board for approval, and the city was advised to employ a competent consulting engineer to survey the present sewerage with a view to the necessity of purification of the sewage in the future, and to prepare a plan which should provide also for receiving the flow from sewers to be subsequently built.

The recently completed sewage purification plant at Shreve was found, upon inspection, to have been constructed in a generally satisfactory manner and in accordance with the plans. Two minor changes needed were noted, however. Small concrete abutments should be provided at the points where the outlets from the dosing chamber enter the filters; and the main drains from the filters, discharging into the creek, should be constructed of cast iron near the outlets, instead of vitrified pipe, to prevent the drains from becoming displaced and broken during high stages of the stream. The authorities were so notified, and were also advised that in the selection of a superintendent of sewers (required by the Board's approval) a man be secured who is competent to supervise the operation of the purification plant also.

July 3rd, the mayor of Akron came to Columbus for a conference with the Secretary and the chief engineer regarding the plant for disposal of garbage and sewage for Akron.

NUISANCES.

One of the engineers investigated unsanitary conditions at Dover. The cesspool constructed for the Masonic Temple was found to be of unsatisfactory design, having an overflow into a surface watercourse; a violation of the Ohio Building Code; and a cesspool at the Dover Inn is of unsatisfactory construction. The overflow from this empties into a manhole to which several cellar drains are connected, and a marked nuisance is thus created. The health officer was advised that in the event of the impossibility of securing sanitary sewers, cesspools should be properly constructed so as to avoid contamination of the soil and surface streams, and he was asked to use his influence in seeing that the conditions at Dover are corrected.

One of the engineers inspected conditions at Geneva-on-the-Lake, and found that the sewage from several large boarding houses was improperly disposed of and that improvements should be made, either by constructing cesspools of proper design, or in a more comprehensive way by constructing a sewer to carry the wastes to a proper disposal plant. In the opinion of our engineer, the cost of a sewer to intercept

the sewage from these boarding houses, with suitable purification plant, would probably cost less than to install cesspools in accordance with the Ohio Building Code. It was therefore recommended that the owners of these boarding houses co-operate in the construction of such a sewer and purification plant, and with this in view, that they retain the services of a competent sanitary engineer to furnish a design and estimate of cost.

Upon the request of the board of health, one of the engineers investigated the unsanitary conditions at Grand Rapids. The investigation disclosed that in the absence of sanitary sewers sewage from a number of dwellings is improperly disposed of in carelessly constructed cesspools, thereby creating nuisances. The board of health was advised of the importance of exercising its power in seeing that the provisions of the Ohio Building Code are strictly followed in the construction of cesspools.

The Cleveland Boys' Farm near Hudson was visited by one of the engineers and a decided nuisance in a small branch of Brandywine Creek was found, caused by the sewage from this farm. Plans for a sewage purification plant at the institution were approved by the Board last September, but the construction of the plant has been needlessly delayed. The director of public safety at Cleveland was urged to push the construction of this plant, which is being done by direct labor employed by his department.

The advice of the Board was asked in regard to the advisability of discharging the wastes from the Cottage Creamery Company's plant into the sanitary sewers at Orrville. It was learned by investigation that the wastes from the existing plant, as well as from a proposed new installation, are concentrated and would prove detrimental to the operation of the sewage purification plant. It is necessary that some method of purification of the wastes be provided and owing to the location of the creameries it is undesirable to place complete purification plants, comprising tanks and filters, and it appears necessary to depend upon the tank treatment alone to improve the character of the wastes before discharging them into the sewers. The superintendent of water works and sewers at Orrville, and the creamery company, were so advised. They were also advised that the type of plant should be selected by a competent sanitary engineer after a study on his part of the problem involved.

The plant of the Sunbury Co-operative Creamery Company at Sunbury was inspected by one of the engineers, who found that the quantity of wastes reaching the plant had greatly increased during the past year or so, due largely to the entrance of water from the refrigerator plant. It being unnecessary and inadvisable to apply this clean water to the plant, greatly overworking the various devices, the company was advised that the overburdening of the plant causes improper

purifying of the wastes and the water from the refrigerator plant should be conveyed in a separate sewer to a suitable outlet, and the entire purification plant should be overhauled and placed in good working condition to prevent its deterioration.

The pollution of Grand River by the wastes from the Diamond Alkali Company's plant at Painesville has been investigated but a report has not yet been prepared.

CESSPOOLS AND RESIDENTIAL SEWAGE DISPOSAL PLANTS.

The chief engineer has granted the following approvals:

June 25th, approval of plans and specifications for a sewage disposal plant for a high school building at Ohio City.

June 27th, approval of the location and method of constructing a cesspool for Mr. Oscar Alge at Huntsville.

July 3rd, approval of the location and method of constructing a cesspool for Mrs. Amelia Warner, at Geneva-on-the-Lake.

June 25th, one of the engineers, upon request of the health officer, visited South Newburg, Cuyahoga County, to investigate a complaint concerning an illegally constructed cesspool. The health officer was advised of a recent decision of the Attorney General in which he held that the Ohio Building Code does not apply to residences.

OPINION OF ATTORNEY GENERAL.

June 27th the Attorney General, in answer to a request for an opinion on the enforcement of the provisions of the State Building Code relating to plumbing, advised that in his opinion none of the provisions of the building code relate to private residences. This decision will relieve the State Board of Health from considering plans for cesspools and residential sewage disposal plants for this class of buildings.

STATE INSPECTOR OF PLUMBING.

The State Inspector of Plumbing has made inspection at the Clarke County Children's Home, Dayton, Defiance, Delphos, Findlay, Lima, Marion, Ohio City, Springfield, Urbana, and Zanesville. Plans have been reviewed and recommendations made. Orders were issued to the owners of seven buildings in Springfield and thirty days' time given in which to make necessary changes.

June 18th, the Inspector met with the journeymen plumbers of Springfield and explained the provisions of the State Plumbing Code; and June 28th, met with the council of that city in regard to an appropriation being made for a local plumbing inspector.

Since the last report, fifty-eight inspections have been made by a representative of the Board, and thirty-nine different place have been visited.

AUGUST MEETING.

COMMUNICABLE DISEASES.

Smallpox.

Since my July report 55 cases of smallpox have been reported as follows: Athens County, York Township, 7; Cincinnati, 5; Columbus, 3; Dayton, 8; Kenmore, Seneca County, 25; Tiffin, 1; Toledo, 5, and Washington Township, Lucas County, 1.

Three inspections have been made on account of smallpox.

The epidemiologist investigated an outbreak of smallpox at Kenmore on July 16th, and Newberry Township, Miami County, July 27th. His reports may be found on a subsequent page.

July 26th, Dr. George Chapman made an inspection of a suspected smallpox patient in West Toledo. Besides the patient, whom he found to be a victim of discrete smallpox, the family consisted of his wife and five children. The children were vaccinated, quarantine was established and no spread of the disease is anticipated.

Acute Poliomyelitis.

May 16th, a case of acute anterior poliomyelitis developed in Barberton, which was followed by other cases in June and July. The epidemiologist was sent to Barberton on July 13th, there being at that time fourteen cases.

July 28th, he went to Barberton to perform a post mortem on a case of infantile paralysis. Typical lesions in the cord were found. He also investigated two new cases.

On account of several new cases he again visited Barberton on August 7th. There have been in all twenty-five cases and three deaths.

His report may be found on a subsequent page.

Typhoid Fever.

July 18th, the epidemiologist was sent to Tiffin to investigate an epidemic of typhoid fever, the health officer having reported fifty cases. His report may be found on a subsequent page.

The committee consisting of the President, Dr. Grube and the Secretary, to whom was referred the filling of the position as chief of the laboratories, met on July 26th and after consideration made a report which is to be presented at this meeting.

On July 8th, the President, Secretary and chief engineer held a conference in the office of the Secretary, with Mr. Frank Rockwell,

mayor; Mr. Jonathan Taylor, city solicitor, of Akron; Mr. C. D. Crouch, Mr. C. C. Benner, and Judge Dewitt C. Badger (of Columbus) representing the Public Service Finance Corporation, and Mr. A. F. Matlack, engineer for the Hopcroft-Matlack Process of Sewage Disposal, relative to the Board's disapproval of this process for the disposal of the sewage of Akron, given at its meeting held July 18th.

Notice has been received from the Mahoning Valley Water Company that they will be unable to have plans for filtering the water supply of Struthers completed in time for submission at this meeting but will submit plans in time for consideration at the September meeting of the Board.

BENSE PROPOSITIONS.

The order requiring the city of Cleveland to remove pollution from the Cuyahoga River was prepared and submitted to the Governor and Attorney General July 22nd, but is being held by the Governor as he has been requested to give representatives of the village of Newburgh Heights a hearing.

Notice of the action of the Board taken at the July meeting was sent to the authorities of Iron-ton, and they replied that all possible haste in the installation of the test unit would be made as soon as the river reaches a stage where they can work to advantage. Complainants in regard to the condition of the present water supply have been referred to the Governor, who is holding the Board's order requiring that city to install a water purification plant.

PROPOSED OR ADDITIONAL WATER SUPPLIES.

Proposed or additional water supplies have been investigated by one of the engineers at Fairpoint (The Provident Coal Company), Newark, New Concord, Trenton and Wilmington.

Reports have been prepared for consideration at this meeting on proposed additional water supply for Canal Dover; proposed water supply for East Youngstown; proposed water supply and purification for Fairpoint; proposed treatment of the public water supply of Lima with copper sulphate; proposed deferrization plant at Minster; proposed water supply for Navarre, proposed water supply for New Concord; extension of public water supply at Newark; proposed water purification plant for Willoughby, and improvement and enlargement of the water purification plant at Youngstown.

EXISTING WATER SUPPLIES.

The existing water supply has been examined in the following places: Caldwell, Dennison and Uhrichsville, Hamilton, Medina, New Carlisle and Woodsfield.

Upon examination of the public water supply at *Hudson* it was found that the supply has been installed in accordance with the plans approved by this Board in November 1910. Analyses of samples from the wells and distribution system indicate that the water is of good quality from a sanitary standpoint, though excessively hard and containing a high iron content, the latter constituent being sufficient to cause the water to become turbid and therefore objectionable for domestic purposes. It is evident that some process for the removal of the iron should be installed, and the board of trustees of public affairs was urged to secure from a competent engineer plans for such an improvement and submit same to this Board for approval.

A partial examination has been made of the public water supply of *Steubenville*, which is still obtained from the Ohio River. It was found that no steps have been taken to improve the supply. The attention of the director of public service was again called to the unsanitary character of the public water supply and the city urged to employ a competent engineer to prepare plans for its improvement.

The public water supply and several private wells at *Westerville* have been examined. The analyses of samples from the wells indicate that they should be abandoned and filled and the board of health was so notified. One of the wells is suspected to have caused at least one case of typhoid fever.

The examination of the public water supply indicated that a number of features in the method of obtaining and handling the supply should be improved. These were pointed out to the authorities. The water was found, upon analysis, to be of satisfactory quality from a sanitary standpoint, although it is exceedingly hard and contains a very high iron content which should be removed by the installation of a process for the removal of the iron.

PROPOSED SEWERAGE AND SEWAGE PURIFICATION.

One of the engineers investigated proposed sewerage or sewage purification at Celina, Cleveland (Citizens Land and Improvement Company), Granville, Warren County Infirmary at Lebanon, for a school house at Mason, New Carlisle (proposed cesspool construction), proposed site for sewerage and sewage purification at New London, and sewerage for the Toledo Glass Manufacturing Company.

Sewerage conditions were also investigated at Conneaut and Massillon, and the existing sewerage at Kent and at Dennison and Uhrichsville was inspected.

Reports have been prepared for consideration at this meeting on proposed sewerage and sewage purification at Cleveland (Citizens Land and Improvement Company) Granville, New London, and the necessity for sewerage Main Sewer District No. 2, Lucas County.

Upon examination of the sewage purification plant at Clyde it was found to be operating in a satisfactory manner and producing a very good effluent. The condition of the plant is largely due to the careful attention which it receives. The plant is, however, operated at its maximum capacity, and the mayor and council were therefore advised to take immediate steps to enlarge it, and that such enlargement should possibly include the installation of tanks for the preliminary treatment of the sewage. They were further advised to employ a competent engineer to prepare proper plans for the improvement and enlargement of the plant.

On August 9th, the chief engineer approved the sand, sample of which was submitted August 8th by Mr. C. W. Wood, for use in the sewage purification plant at Andover, advising that particular attention be given to the coarse material contained in the sand and that any containing large particles in a greater percentage than the sample submitted be rejected.

Cesspools.

July 13th, the chief engineer approved the location and method of constructing a cesspool for the residence of R. N. Hoskins, at Geneva-on-the-Lake.

July 13th, the chief engineer approved the location and method of constructing a cesspool for the residence of Miss Neda Warner, at Geneva-on-the-Lake.

Nuisance.

Upon request of the health officer, one of the engineers, on June 24th, investigated the pollution of the Grand River by the wastes from the Diamond Alkali Company at Painesville.

Samples of the wastes and also from the river were collected to determine the character and extent of the pollution. The superintendent stated that the wastes from this plant consist of approximately 10,000,000 gallons daily of cooking water, discharged into a ditch leading to the Grand River, and 4,000,000 gallons daily of concentrated wastes. The flow is so excessive that the ditch is scoured and considerable suspended matter is thus introduced into the flowing liquid. Analysis of the cooking water indicated that it contains an appreciable amount of wastes from the processes of manufacture and also of sewage. The company was advised that these conditions could doubtless be improved by extending the outlet to the Grand River and thus prevent the wastes becoming turbid.

The concentrated wastes, as demonstrated by our analyses, contained principally calcium and sodium chloride in very large amounts. The storage of these wastes in a large reservoir causes objectionable conditions, and it was noted that the vegetation in the vicinity had been killed. At the time of the investigation there was no overflow from

the reservoir to the river, although the presence of sludge in the stream would indicate that the wastes had overflowed recently. The character of these wastes is such that the discharge of them into the river must be attended by the production of a nuisance.

The company was advised that the conditions attending the disposal of the wastes from its plant will be rendered more serious as the operation of the plant is continued, and in the not far distant future it is reasonable to expect that considerable difficulty will be encountered in disposing of the wastes by way of the river; and that it would appear, therefore, of the utmost advantage to have the problem of the disposal of these wastes studied in a comprehensive manner in order that some permanent and satisfactory method of disposal may be secured.

The abatement of the nuisance created is a matter for action by the local health authorities and not the State Board.

INVESTIGATION OF SUMMER RESORTS.

Buckeye Lake.

The sanitary conditions of the summer resorts on Buckeye Lake (Fairfield, Licking and Perry counties) were examined on July 28th by the Secretary and the Chief Engineer. The area of this lake is estimated at 4000 acres. About 900 cottages are along the shore and on islands in addition to those in Buckeye Lake Park, Summerland Beach and Lakeside.

Letters were sent to the authorities of Licking and Union townships, Licking County, calling attention to the conditions found, and recommending improvements that should be made. A full report of this investigation may be found on a subsequent page.

Indian Lake (Lewiston Reservoir).

July 28th, the summer resorts on Indian Lake (Lewiston Reservoir) in the northwestern part of Logan County, were visited by the epidemiologist and one of the engineers, and a report of this investigation is given on a subsequent page.

Miami Valley Chautauqua.

July 28th, Dr. Grube, member, and the Assistant Secretary made an investigation of the grounds of the Miami Valley Chautauqua Association, located in Montgomery and Warren counties on the west bank of the Great Miami River, fourteen miles south of Dayton.

August 2nd, a letter was sent to the general manager of this association, with the recommendation for bettering the conditions of the grounds and for the health and comfort of those who visit them. A full report of this investigation is printed on a subsequent page.

Since the last report, fifty-seven inspections have been made by a representative of the Board, and forty-five different places have been visited.

STATE INSPECTOR OF PLUMBING.

The State Inspector of Plumbing addressed a convention of the Ohio State Association of Journeymen Plumbers at Lima July 15th, and a meeting of master plumbers at Hamilton July 19th, explaining the provisions of the State Plumbing Code.

Inspections were made at Columbus, Cuyahoga Falls, Frankfort, Greenfield, Lima, Martinsville, Oak Harbor, Oxford, Paulding, Piqua, Springfield, Tiffin and Wapakoneta; and tests were made at Chillicothe, Findlay, Lima, Marion, Springfield, Urbana, and Wapakoneta.

The report of the State Inspector of Plumbing may be found on a subsequent page.

SEPTEMBER MEETING.

COMMUNICABLE DISEASES.

Smallpox.

Since my August report twenty-one cases of smallpox have been reported. These are distributed as follows:

Hamilton County, Cincinnati 1, Norwood 1; Highland County, Brush Creek Township 11; Lucas County, Washington Township 7; Miami County, Bradford (not yet reported upon), Newberry Township 1; and Ross County, Paint Township 1.

August 29th, upon request of the health officer, Dr. Hegner went to Norwood where he saw a case, which he diagnosed smallpox. The man had come from Hazelpatch, Laurel County, Kentucky, six days before, but reported that there were no other cases there, to his knowledge. He was sent to the pest house and the house in which he was found was quarantined and its occupants and others known to have been exposed were vaccinated and fumigated.

September 4th, the epidemiologist visited Brush Creek Township, Highland County, as there had been fourteen cases of smallpox in and around Elmville, a small settlement five miles from Sinking Springs. September 6th, a telegram and letters having been received from Bradford, Miami County, asking that an inspector be sent to diagnose a disease prevailing there which resembled smallpox but which was thought by some physicians to be chickenpox, he was sent to Bradford to make an investigation. His report will be found on a subsequent page.

Typhoid Fever.

September 7th, the health officer of Circleville reported six cases of typhoid fever in a boarding house in that city. The epidemiologist was sent there to make an investigation and report.

Acute Poliomyelitis.

August 23rd and 24th, and again September 3rd, the epidemiologist visited Dayton to investigate cases of acute poliomyelitis and cerebro-spinal meningitis, both of which are prevailing in that city. Further details may be found in his report.

September 7th, Dr. Sutton and the epidemiologist went to Roseville to investigate an outbreak of acute poliomyelitis.

During July and August 96 cases and 18 deaths have been reported from acute poliomyelitis. In addition to these 28 cases and 25 deaths were reported in Dayton from cerebro-spinal meningitis. These cases of acute poliomyelitis were distributed as follows:

<i>County.</i>	<i>Place.</i>	<i>Cases.</i>	<i>Deaths.</i>
Allen	Marion Township	1	..
Butler	Middletown	2	1
Clinton	Wilmington	1	1
Cuyahoga	Nottingham	1	..
Darke	Arcanum	1	..
	Greenville	2	2
Greene	Osborn	1	1
Guernsey	Cambridge	1	..
	Londonderry Township	1	..
Huron	Bellevue	1	..
Logan	DeGraff	1	1
Lucas	Sylvania	1	..
Madison	London	1	..
Mahoning	Youngstown	1	1
Medina	Wadsworth	2	1
	Wadsworth Township	1	..
Miami	Tippecanoe City	1	..
Montgomery	Dayton	17	6
	Germantown	1	..
	Jefferson Township	1	1
	West Carrollton	1	..
Muskingum	Roseville	10	..
Paulding	Antwerp	1	..
Seneca	Tiffin	4	..
Summit	Barberton	35	1
	Twinsburg Township	2	..
Warren	Lebanon	3	3
Wood	Bowling Green	1	..
Total		94	18
Cerebro-spinal meng.		28	25
		122	43

The health officer at Barberton has been advised to close the schools to all children between the ages of five and ten years.

It was learned that a woman with two children left Akron and went to Glenmont, and that one of the children was suffering with poliomyelitis. The health officer of Glenmont was immediately instructed to quarantine these people but he found that the woman had taken the children and gone back to Akron. The health officer of Akron was at once notified.

The following rules have been furnished the health authorities where cases of this disease have been reported:

1. Isolation of the patient and screening to keep out insects.
2. Disinfection or destruction of *all* discharges, especially the sputum and nasal secretions and excretions from the intestines. Nurse and physician should observe the same precautions regarding their hands and clothing as in attending a case of scarlet fever.
3. A modified quarantine should be observed. Children should certainly be excluded from school. The breadwinner should be allowed to work. Three weeks should be the minimum period of isolation and quarantine.
4. Members of the family and exposures should use a gargle and spray consisting of 1% of hydrogen peroxide.
5. As soon as practicable after recovery of the patient, the household should be disinfected with formaldehyde.
6. In addition the attention of physicians should be called to the fact that abortive cases are often associated with typical cases and the same precautions should be observed with them.

PROPOSED OR ADDITIONAL WATER SUPPLIES.

Pleasant City was visited by one of the engineers in regard to proposed water supply.

Reports have been prepared for consideration at this meeting on proposed water purification for Portsmouth, illegal installation of a water supply at Payne, and on the existing water supply at Woodsfield with reference to the necessity for purification.

EXISTING WATER SUPPLIES.

The existing water supply at Defiance and at Findlay and the water purification plant at Batavia were inspected by one of the engineers.

Recent inspection of the water supply of Athens indicated that it is in good condition. The samples from the wells and from the tap on the distribution system showed that the water is of good quality at the present time. There was marked evidence of contamination in the analytical results, however, and the director of public service was urged to give particular attention to the proper maintenance of the surroundings of the wells, exercising sanitary supervision over the territory within 1000 feet of the wells.

Report has been made upon a recent examination of the public water supply at Caldwell. This supply is drawn directly from Duck Creek, and has never been approved by the State Board of Health. The

quantity of water available is insufficient and the quality is unsatisfactory and unsafe for domestic purposes. There is a widespread desire on the part of the citizens and officials to secure a new water supply of more satisfactory quality and they were advised to employ a competent and experienced engineer to advise them regarding the best method of development and an estimate of cost.

Report has been made upon the water supply of Chillicothe. The analyses indicated that the water is at present of satisfactory quality. The attention of the water company was called to the high iron content of the water and it was suggested that the company investigate the feasibility of installing a process for its removal. The surroundings of the supply wells were found to be in good condition.

A recent examination of the public water supply at Hamilton, as well as former examinations, indicated that the conditions surrounding the public water supply wells are such as to create a menace to the quality of the supply. It was observed that the water level in a pond which surrounds the wells is lowered considerably as a result of pumping the wells, which fact points to a direct or indirect connection between the pond and the wells. Samples from the pond indicate that it is polluted. Preliminary steps are being taken by the city to provide a new water supply and one test well has been drilled. The authorities were advised to immediately employ an experienced engineer to survey the situation and submit general recommendations for a public water supply.

Upon recent examination of the public water supply at Troy, it was learned that the so-called Main Street wells had been abandoned owing to poor yield and that the entire supply is derived from the so-called C. H. & D. wells and a group of wells near the pumping station. Analyses show that the quality of the supply is undergoing a gradual deterioration, due largely to unsanitary conditions in the vicinity of the water supply wells and also in a measure to the draft on the wells. The authorities were advised that owing to the threatened inadequacy of the present supply, steps should be taken to secure a new supply satisfactory as to quality and quantity. The question is being agitated and they were urged to employ a competent consulting engineer to advise them in the selection of a suitable source.

Report of an examination of the water supply at Sidney shows the water to be of good quality and satisfactory for domestic use from a sanitary standpoint. It is, however, objectionable on account of its extreme hardness. It was learned that it is occasionally necessary to take water from the Miami River through an emergency intake, the use of this intake probably being required on account of the small capacity of the collecting well which stores the supply from drilled wells. The authorities were advised to adopt regulations governing the use of the emergency supply and to provide that when it is absolutely necessary to

use the river water, warning be given people through the health officer and public press to boil all water used for drinking purposes.

Although the water supply at Wellston is obtained from an infiltration well along Little Raccoon Creek, our recent investigation showed clearly that the water obtained from this well is practically the raw creek water. At the time of investigation the creek was very turbid as a result of recent rains and the water in the well and distribution system showed the same objectionable characteristics. The analytical results of samples collected at the pumping station, reservoir and tap on the distribution system indicated that the supply was of entirely unsatisfactory quality for domestic use and its use should not be permitted without boiling. The director of public service was urged to instruct the health officer to so notify the consumers. He was also advised that the water supply should be improved and that the city should immediately employ a competent engineer to advise as to the proper method of procedure.

PROPOSED SEWERAGE.

Athens, Linden Heights, Millersburg and Napoleon were visited by an engineer of the Board relative to proposed additional sewerage, and reports on the same have been prepared for consideration.

EXISTING SEWERAGE AND SEWAGE PURIFICATION.

The existing sewerage at Defiance and Findlay was inspected, and the sewage purification plants at Bellefontaine, Pleasant Ridge and Shelby were examined.

A report upon an examination of sewerage conditions at Conneaut indicates that the discharge of sewage into Conneaut Creek at several points causes objectionable conditions in the stream, particularly near the outlet of the sewers in the central portion of the city. The authorities were advised that these conditions demand that improvement be made by the collection of the sewage at one point where it may be purified before discharging it into Conneaut Creek or Lake Erie.

One of the engineers investigated conditions in Dennison and Uhrichsville. He found that sewers had been constructed at various times without the approval of the State Board of Health, and that they discharge into Little Stillwater Creek at different points within the village. At low stage the flow of the stream is insufficient to dilute the sewage and a decided nuisance is created. It is necessary that immediate steps be taken to provide for the collection of the sewage at one point and its purification before its discharge into the stream.

It was found at Uhrichsville that one sewer accommodating a small group of residences discharges above the dam impounding the reservoir from which the water supply is obtained.

The authorities of these villages were advised to employ, conjointly, a competent sanitary engineer to report upon the feasibility of collecting the sewage flow of both villages at one point for purification.

In connection with the general examination of the watershed of the Scioto River, the sewage purification plant at the Girls' Industrial Home near Delaware was inspected and found to be in good condition and operating satisfactorily.

About $1\frac{1}{2}$ miles below Kenton it was found that a rendering establishment is being conducted on the banks of the Scioto River, and that it is creating a decided nuisance both on account of odors produced and foul wastes which are discharged into the river directly. The attention of the health officer of Buck Township was called to the matter and he was urged to take immediate steps to secure improvement in the conditions surrounding the plant and prevent the discharge of liquid wastes into the Scioto River or have the establishment removed.

BENSE PROPOSITIONS.

The chief engineer visited Shelby to investigate a complaint made under the Bense Act by the authorities of Cass Township, Richland County, in regard to the sewage purification plant at Shelby. A report has been prepared for consideration at this meeting.

Letters have been sent to the authorities of Center Township, Williams County, (who made the complaint against the Bryan Fertilizer Company), the authorities of Bucyrus, Bowling Green, Delaware, Wilmington and Van Wert, asking that the Board be informed at once what steps had been taken toward carrying out the orders of the Board so that the matter could be further considered at this meeting.

SANITARY INSPECTION OF FLOODED DISTRICT IN EASTERN OHIO.

In response to telegrams, one of the engineers was sent to Salineville, Minerva and Irondale to advise the authorities in regard to improving conditions caused by recent floods. His report may be found on a subsequent page.

One of the engineers visited Westwood to investigate the complaint of a nuisance caused by the sewage of Cincinnati.

The chief engineer visited Cincinnati August 14th and August 27th, to confer with the engineering committee in regard to reports to be considered at the meeting of the Board and in regard to the sewage and garbage disposal question at Akron.

August 19th an ordinance was approved by the Secretary, proposed for adoption by the village of Navarre in compliance with the second condition of the Board's approval of a water supply for that village June 19th, 1912.

INVESTIGATION OF SUMMER RESORTS ON LAKE ERIE.

In connection with the investigation of summer resorts, the Assistant Secretary visited the public resorts on Lake Erie west of Cleveland and east of Toledo, including the islands lying north of Sandusky. The investigations were made August 20th to 24th inclusive, and reports were prepared upon the conditions found and letters addressed to the proper authorities recommending improvements that should be made. The places visited were: Beach Park at Avon; Glen's Beach, Century Park and the municipal bathing beach at Lorain; Crystal Beach and Linwood Park at Vermilion; Ruggles Grove, a resort located between Vermilion and Huron, adjoining Mitiwanga, owned by Mr. Charles Ruggles; Mitiwanga, a resort located about half way between Vermilion and Huron; Rye Beach, a resort about seven miles east of Sandusky; Middle Bass; Put-in-Bay; Kelley's Island, an incorporated village; Lakeside, one of the oldest resorts on Lake Erie, operated by The Lakeside Campmeeting Association; Erie Beach, immediately west of Lakeside; Cedar Point, a resort located on the point that forms the east boundary of Sandusky Bay, owned and managed by a private corporation and the most popular resort on the lakes, and Catawba Island, located on the northern point of Catawba Island Township, Ottawa County, nine miles from Port Clinton.

In the August report the conditions found at Buckeye Lake and Summerland Beach were reported upon. Since that time the local health authorities, upon receipt of the recommendations of this Board, made an investigation and ordered necessary improvements, and the management of Buckeye Lake Park has engaged the services of an engineer to prepare plans for sewerage and sewage disposal for that place.

Buckeye Lake.

Lakeside, Avondale, Patterson's and Thornport, small places on Buckeye Lake, have been visited by one of the engineers and a report made upon conditions found is given on a subsequent page.

Indian Lake.

The health officer of Washington Township, Logan County, called at the office of the Secretary August 16th, 1912, and signified his willingness to comply with the Board's recommendations in regard to removing sewage pollution from Indian Lake, making buildings more sanitary, disposing of garbage, providing screens, etc.

Since that time one of the engineers made another investigation of the following places in company with the health officer of Washington Township; Potters Landing, The Wedge, the Bulkhead, Cottonwood, Edgewater, Turkeyfoot Point, Sassafras Point and Lakeview Park.

Practically the same conditions exist at all of these places and a letter was sent to the authorities of Washington and Stokes townships, Logan County, with recommendations for improving sanitary conditions.

THE STATE INSPECTOR OF PLUMBING.

August 16th, 1912, the State Inspector of Plumbing held a conference with the local board of health, city plumbing inspector, and committee of master plumbers in Springfield, in regard to enforcement of the state and city plumbing codes. He also held a conference in Sidney relative to plumbing for a school building.

Inspections were made at Bellaire, Clyde, Cuyahoga Falls, Miami University at Oxford, Tiffin and Wapakoneta. Inspections and tests were made at Bylesville, Chillicothe, Dayton, Defiance, Findlay, Franklin, Hamilton, Lima, Martins Ferry, Ohio City, and Piqua. Tests were also made at Urbana and Wapakoneta.

Orders for necessary changes in plumbing were issued to the owners of two buildings in Lima and one in Tiffin.

The Inspector's report may be found on a subsequent page.

Since the August report sixty different places have been visited by a representative of the Board and eighty inspections made.

OCTOBER 23rd, MEETING.

COMMUNICABLE DISEASES.

Smallpox.

Since my September report there have been thirty cases of smallpox reported. These were distributed as follows: Adams County, Bratton Township (?); Cuyahoga County, Cleveland 3, Warrensville Township 2; Highland County, Brush Creek Township 2; Lucas County, Toledo 2; Miami County, Bradford 13, Newton Township 5; and Montgomery County, Dayton 3.

On September 16th it was reported that smallpox was epidemic in Pittsburg, Pa. A telegram of inquiry was addressed to the health officer there and he replied that there were eighty-four cases and nineteen deaths. A telegram was sent to the health officers at Youngstown, Bellaire, Steubenville, East Palestine and East Liverpool, notifying them of the presence of smallpox in Pittsburg and instructing them to use every means to prevent its introduction into Ohio through their city. Some of the local officials thought it necessary to inspect all trains coming from Pittsburg, but they were informed that the only inspections necessary was an observation of all persons coming to the community from that city.

On his visit to Bradford September 9th, the epidemiologist learned that smallpox had prevailed there since June. Another visit was made October 3rd, and a fuller report may be found on a subsequent page.

Chickenpox.

October 1st, 1912, upon request of Mr. John W. Hill, Dr. Hegner investigated a case, thought to be smallpox, in Hamilton Township, Warren County; a girl fourteen years of age. After careful examination of the patient, the history of this and two other cases from whom she was supposed to have been infected, he diagnosed the case chickenpox. The health authorities were urged to enforce rigid quarantine of all families infected and all subsequent cases that might develop.

Acute Poliomyelitis.

The number of cases of acute poliomyelitis appears to be decreasing, except in the city of Cleveland, where the disease has assumed epidemic proportions. Some communities (Urbana and others) are suffering from cerebro-spinal meningitis, which, however, may be a form of acute poliomyelitis.

Fifty-nine cases and 21 deaths have been reported since my last report, in September. These were distributed as follows:

<i>County.</i>	<i>Place.</i>	<i>Cases.</i>	<i>Deaths.</i>
Belmont	Bethesda	1	1
Coshocton	Coshocton	1	1
Cuyahoga	Cleveland	35	7
Darke	Greenville Twp.	1	1
Delaware	Delaware	1	..
Erie	Sandusky	..	..
Greene	Spring Valley	1	1
Guernsey	Cambridge	1	1
Highland	Hillsboro	1	1
Huron	Norwalk	1	..
Medina	Sharon Twp.	2	..
	Wadsworth	1	..
Mercer	Coldwater	2	1
	Washington Twp.	1	1
Montgomery	Dayton	2	2
Muskingum	Zanesville	1	..
Paulding	Harrison Twp.	1	1
Preble	Lewisburg	1	1
Richland	Mansfield	1	..
Sandusky	Burgoon	1	1
Summit	Stowe Twp.	1	..
Tuscarawas	Canal Dover	1	..
Washington	Beverly	1	1
		59	21

The Secretary, in connection with the epidemiologist and the bacteriologist, is conducting experiments on poliomyelitis, its etiology, mode of transmission, etc., and has enlisted the assistance and co-operation of the Department of Zoology at the Ohio State University, in order that the entomological side of the investigation may be properly conducted. Reports on the experiments will be submitted at a later date.

During the week ending September 7th there had been several cases of acute poliomyelitis reported in Roseville, and there was some doubt among the physicians there as to the diagnosis, though it was believed that all cases were of the same nature.

September 7th, Dr. Sutton and the epidemiologist visited Roseville and investigated two cases—the first case seen was diagnosed acute poliomyelitis and while there was some doubt, the second case was also believed by them to be suffering with that disease. There seemed to be some connection between these cases and the case reported in Washington County.

The epidemiologist, with a special delegation of physicians from Roseville, met with other members of the Muskingum County Medical Society to discuss acute poliomyelitis. They were addressed by Dr. Sutton. Instructions in the measures of prevention recommended by this Board were given; and a number of cases of a suspicious nature were reported by the members of the society.

September 20th, at the request of Dr. Charles Baker, a member of a committee appointed by the Darke County Medical Society to investigate the situation as to acute poliomyelitis, the epidemiologist met with the committee in Greenville to discuss this question. The county had been divided into three sections, each being represented by the committee. Every physician in Darke County is to be visited personally, and blanks supplied by the State Board of Health used in getting information concerning cases. A meeting to take place later is to be devoted to the subject of acute poliomyelitis and an endeavor is to be made to secure the services of an authority on the subject from one of the large cities.

It is very gratifying to find such a deep interest taken in this subject from the standpoint of prevention.

September 24th, upon request of the health officer of Xenia the epidemiologist went to Spring Valley to make an autopsy, death having resulted from acute poliomyelitis.

September 18th and 20th, the Secretary attended the fortieth annual meeting of the American Public Health Association in Washington, D. C. The President and Vice-President also attended this meeting.

The Association is divided into five sections: Laboratory, Vital Statistics, Sanitary Engineering, Municipal Health Officers and Sociological. The program was unusually interesting both in the general and section meetings.

The work of the Laboratory Section was devoted to consideration of improvements in laboratory methods and the development of standard method reports of experiments relating to public health work.

September 20th and 21st, the President, Vice-President and Secretary attended the twenty-seventh Conference of State and Provincial Boards of Health of North America, held in Washington, D. C.

The work of the conference consisted largely in hearing and discussing reports of various committees. One of the important problems which was given very careful consideration was the dealing with the transportation of the dead. The old and obsolete rules were practically revised and unnecessary regulations removed. The means of preventing and handling trachoma were given some careful consideration in papers and discussion. This disease was not dealt with in a committee report but was brought up for consideration of the conference for the first time. The conference was of the opinion that the best and most effective means of handling the various lepers who are distributed over the country and who have caused so much trouble, is for the United States Government to establish a leprosarium and all cases be transmitted to that institution.

September 23rd-28th, Drs. Warner and Grube, Mr. Hill and the Secretary attended the fifteenth International Congress on Hygiene and Demography, held in Washington, D. C.

A large representation from the various foreign countries was present. On the opening day President Taft welcomed the delegates on behalf of the United States, and responses were made by representatives from England, Canada, Spain, Germany, France, Belgium, Italy, Holland, Sweden, Denmark, Russia, Japan, Brazil, Chili, Mexico, and other countries.

The Congress was divided into two divisions: Hygiene and Demography, the former being sub-divided into eight sections. In the section meeting many interesting symposiums were held and papers read dealing with such vital subjects as, Poliomyelitis-Etiology and Mode of Transmission; Hookworm Disease; Occupational Diseases; The Prevention of the Spread of Communicable Diseases through Traffic, Public Health Administration and Organization; Public Health Education; The Filterable Virus, such as Measles, Typhus Fever, etc.; Protective Inoculation; Parasitic Amoeba; Paratyphoid infections; Anaphylaxis; Food Substances; Nutrition and Growth; Practical Dietetics, Ventilation; Exercise; Infancy and Childhood; School Inspection; Child Conservation; Dental and Oral Hygiene; Race and Sex Hygiene; Railway and Ship Sanitation; Vital Statistics; Training of Demographers, and a great volume of other valuable material was presented.

A very remarkable Health Exhibit was held in connection with the Congress. A large number of state and municipal boards of health, philanthropic societies, insurance companies, industrial concerns, the

Public Health Service, the Medical Department of the Army and Navy, had elaborate exhibits which were very instructive.

In pursuance of instructions of the Board, the Secretary visited the Rockefeller Institute for Medical Research and the Rockefeller Institute Hospital in New York City.

In the hospital, due to the courtesy of the medical director and chief physician, the Secretary was given the opportunity to observe what is being done along the lines of research in clinical medicine, especially as it relates to the work in acute poliomyelitis.

September 16th, 1912, a joint meeting was held by the President and Secretary with the Executive Committee of the Ohio Society for the Prevention of Tuberculosis in the office of the Board. Dr. Sutton, the other member of the Board's committee, was unable to be present.

The meeting was for the purpose of considering the best means of furthering the campaign for the prevention of tuberculosis in Ohio. The Executive Committee of the State society placed itself on record as favoring the securing of an appropriation of \$50,000 for two years, for the purpose of establishing a Division of Tuberculosis as an integral part of the organization of the State Board of Health.

A motion was adopted appointing the Executive Secretary of the society and the Secretary of the State Board of Health a committee with authority to work out the details of the co-operation between the Advisory Committee from the society and the State Board of Health.

The President and Secretary appeared before the joint committee on Public Health and Legislation of the State Medical Association and this committee placed itself on record as favoring the placing of this campaign under the direction of the State Board of Health.

During the absence of the Secretary, attending the conference in Washington, the Assistant Secretary on September 26th attended the conference of the Public Service Commission with representatives of the Interurban Railway called, for the purpose of considering the resolution adopted by the Grand Council of Ohio United Commercial Travelers at their June convention. These resolutions related to requiring the railway company to provide all trains with proper drinking water and toilet facilities.

On October 3rd, the President appointed Dr. Miller a delegate to the meeting of the Society for the Prevention of Infant Mortality held in Cleveland October 3rd and 4th, 1912.

PROPOSED OR ADDITIONAL WATER SUPPLIES.

Alliance, Dayton, Gibsonburg, Glouster, Kenton and Payne were visited by one of the engineers relative to a new or additional water supply, and reports have been prepared for consideration at this meeting on a new water supply for Alliance, Glouster, Payne and Zanesville, an

additional water supply for Gibsonburg, a proposed water purification plant for the Provident Coal Company near St. Clairsville, and the treatment of the public water supply of Lima.

EXISTING WATER SUPPLIES.

The existing water supply in the following places was inspected by one of the engineers: Bellaire, Bluffton, Continental, Gallipolis, Gibsonburg, Lima, Lodi, Mansfield, Marysville, New Lexington, Pomeroy and Wellington.

Recent examination of the public water supply of Batavia revealed the fact that no improvement has been made since our last examination in 1910. Analytical results of the examination of samples of water indicate that the filters are not producing a satisfactory effluent. The effluent shows the presence of intestinal organisms and the water cannot be considered safe for general domestic purposes. The authorities were reminded of the importance of taking immediate steps to improve the plant, both as to its construction and operation, in order that a better effluent may be secured, and they were urged to engage the services of a competent engineer to devise a plan for improving the plant.

Report has been made upon a recent general examination of the public water supply of Findlay. Analyses of samples collected at the pumping station and at various points on the distribution system indicate that some polluting influence reaches the water supply, which may come from seepage into the gravity conduit line, or a leakage through the valve in the emergency intake. At present it is impossible to determine to what extent the gravity conduit is watertight, but the authorities were advised that this point should be thoroughly investigated and care taken to prevent any pollution reaching the conduit. They were also advised that the emergency intake line is unnecessary, with the existing storage reservoir of 6,000,000 gallons capacity, and should be abandoned and removed.

During a recent visit to Hubbard one of the engineers learned that the village is installing a public water supply without having submitted plans or received the approval of the State Board of Health. The authorities were notified that detailed plans should be submitted and a formal request made for their approval.

Report made of a recent investigation of the existing water supply of Lancaster shows that the wells are protected from pollution and furnish an adequate supply. The pumping station and machinery are in good condition and the water is of good quality from a sanitary standpoint.

Report has been made upon examination of the recently installed public water supply at Lodi. It was found that the supply has been properly installed according to the plans approved. The deferrization plant was operating efficiently and producing a good reduction in the

iron content. The authorities were notified that the timbers supporting the coke trays are of insufficient strength and it will be necessary to replace them. Analyses of samples collected at various points indicate that the water is satisfactory from a sanitary standpoint and not objectionable on account of iron.

Report has been made upon an examination of the water supply at the State Institution for the Blind, Columbus; and the analytical results indicate that the supply is safe for general domestic purposes.

Report has been made upon a recent examination of the public water supply of Mansfield. Analytical results obtained from analyses of samples collected from the existing water supply indicate that the water from all sources is satisfactory at the present time for domestic or drinking purposes. The storage reservoir is uncovered, and is therefore subject to the polluting influences of dust and dirt from the street, the railroad, and from an elevator located a short distance west. The authorities were urged to cover the reservoir, or abandon it. In the latter case storage before and after pumping will be required. The Hedges Spring wells were found to need protection, and the authorities were notified that more substantial manholes should be constructed at the top of each well.

At the time of a recent examination of the public water supply of Medina, the supply was being improved by cutting out some one of the infiltration lines furnishing the supply. When the water supply was installed the infiltration lines were placed some distance from the channel of the northern branch of Rocky River, but upon recent inspection it was found that the stream had eroded the channel, submerging one of the lines. The submerged line was exposed owing to the erosion of the gravel covering. This line was therefore receiving river water direct. It is possible that a change in the channel of the stream will submerge the other infiltration line. The quality of the water supply at the time of installation was satisfactory but recent analysis shows that the supply is polluted and unsafe for general domestic purposes. The source of the pollution is probably the direct connection with the raw river water. The authorities were urged to immediately take up the question of making extensive improvements in the water supply, and, with this in view, to employ a competent engineer to devise such improvements.

Since making report upon the flood conditions at Salineville samples of the public water supply have been examined. The authorities have been advised that the well located farthest west of the pumping station receives the overflow from a head tank which is practically over the well, and that the loose cover of the well should be replaced with a watertight roof or concrete cover, or, preferably, the head tank removed from its present location; also that the pump well at the pumping station should be covered to prevent contamination.

The T. and O. C., K. and M., and the Hocking Valley railways have asked the Board, in the interest of public health, to examine the drinking water supply of trainmen and passengers on their lines, claiming that such supply is semi-public in character. At this meeting the Board will be asked to determine a policy in this matter.

PROPOSED SEWERAGE AND SEWAGE PURIFICATION.

The chief engineer visited Buckeye Lake in regard to proposed sewerage and sewage purification; and one of the engineers investigated a proposed storm sewer for the L. S. & M. S. Railway at Toledo, and proposed sewerage and sewage disposal for The Toledo Glass Company of that city. Reports have been prepared for consideration at this meeting on these, and also on proposed sewerage for Sandusky.

Proposed sewage disposal for a school building at Byesville was investigated and the plans, submitted September 9th and 12th, by The Orr Plumbing Company of Cambridge for the work, were approved by the chief engineer on September 12th, 1912.

September 14th the chief engineer approved the sample of filtering material to be used in the proposed sewage purification plant for Brooklyn Sub-division No. 2, submitted by the consulting engineer, R. Winthrop Pratt, on that date in compliance with the first condition of the Board's approval of plans for this plant given August 15th, 1912.

September 21st the chief engineer approved a sample of the sand proposed for use in the construction of the sewage purification plant at the State Serum Institute (Reynoldsbury), submitted September 20th, 1912, in compliance with the first condition of the Board's approval of the plans given July 18th, 1912.

EXISTING SEWERAGE AND SEWAGE PURIFICATION.

The existing sewage disposal plants at Mansfield and St. Marys were inspected and sewerage conditions at Wellington were investigated by one of the engineers.

Upon recent inspection the sewerage system and sewage treatment works at Andover were found to have been generally well constructed in accordance with the plans approved. The principal criticism to be made is that an excessive amount of ground water enters the sewer through leaky joints, which will seriously impair the operation of the plant unless corrected. The authorities were urged to confer with their engineer and make every effort to reduce the leakage entering the sewers.

An inspection of the sewage purification plant at Bellefontaine, recently completed, revealed the fact that there are a number of defects in construction, the principal of which is poor concrete work in the sedimentation tanks and contact filters. The dosing apparatus was found to be operating satisfactorily but the discharging apparatus was not

found to be automatic in its operation, due to leaks in several bells. The authorities were advised to see that the walls of the filters are made watertight and that the leaks in the dosing apparatus are immediately repaired. The director of public service replied that the matter would be given attention at once.

A general examination of sewage conditions was made at Kent upon receipt of complaint. It was found that the plans for a proposed system of sanitary sewers, approved by the Board in 1908, had not been carried out; that a number of sanitary and storm sewers have been constructed, discharging directly into the Cuyahoga River and that the most recent sewer proposed was for the purpose of providing drainage for the State Normal School, plans for which have not been approved by the State Board of Health. The maintenance of existing sewers has been carelessly attended to. A number of instances were found where storm sewers are receiving domestic sewage. In some cases house connections have been made to catch basins, which also receive street drainage, and as a result decided nuisances are created. The authorities were reminded of the importance of undertaking the problem of collecting the sewage from the entire village at one point and purifying it before its discharge into the river.

Upon request of the health officer of Lebanon, the sewage disposal plant at the Warren County Infirmary was inspected. The investigation of sewage conditions at the infirmary revealed the fact that the present method of disposing of the sewage creates a decided nuisance in the ditch which receives the wastes. The elevation of the infirmary is such that it cannot be drained to the sewers of Lebanon, and an independent method for its disposal will be necessary. The only feasible method of disposing of the sewage and other wastes is the construction of a suitable purification works to treat the entire sewage flow from the institution. The board of county commissioners was urged to authorize the installation of such a plant and to engage a competent sanitary engineer to prepare plans, specifications and estimate of cost for the improvement.

A recent inspection was made of the sewage treatment works at Mansfield, and the plant was found to be in an extremely rundown condition. The principal factor contributing to the deterioration of the plant is the high sewage flow, which approximates 3,500,000 gallons per day, when the plant was built to treat 1,000,000 gallons per day. The authorities were urged to secure means of enlarging the plant and to engage the services of a competent engineer to outline the necessary improvements.

Upon recent inspection of existing sewerage conditions at Wellington, our engineer learned that the village has installed two systems of sewers, supposedly for storm water purposes. One of these systems discharges in the western portion of the village. Plans for neither of these systems were submitted to the State Board of Health for appro-

val. The sewers are being used to some extent to carry domestic sewage and the continuance of such practice will result in the necessity of installing sewage treatment works; the existence of storm water in the sewers making the problem of designing and operating such works complicated. The authorities were notified that the most satisfactory way to prevent the misuse of these sewers would be to install a sanitary system of sewers. They were also asked to at once submit plans to the Board showing the existing system of sewers with a request for approval of same.

BENSE PROPOSITIONS.

September 30th the mayor, village solicitor, health officer and other citizens of Newburg Heights, appeared before the Governor and the Attorney General in regard to their protest against the city of Cleveland building a sewage disposal plant within the limits of their village. After giving these officials and representatives of Cleveland a hearing, it was decided that the protest they made was irrelevant to the order issued by the State Board of Health and the Governor and the Attorney General signed the Board's order, which was sent to the Cleveland authorities on that date, requiring the city of Cleveland on or before July 1st, 1915, to cease the pollution of the Cuyahoga River and to install such works or means for purifying or otherwise disposing of its sewage as will remove the pollution from said river.

Bellaire, Bowling Green, Bucyrus, Delphos and Fostoria were visited to learn what, if anything, has been done toward carrying out improvements ordered by this Board.

A report upon all Bense propositions has been prepared for consideration at this meeting.

September 18th, 1912, a petition was received from the clerk of Berne Township, Fairfield County, asking the Board to investigate the contamination of the Hocking River by the Leather Board Works at Lancaster.

Reports have also been prepared for consideration at this meeting on proposed sewage and garbage disposal for Akron; the illegal installation of combined sewers at Westwood (Cincinnati); the sewage purification plant at Geneva; and the extension of time for beginning the construction of sewerage and sewage purification works at New Berlin.

THE STATE INSPECTOR OF PLUMBING.

The State Inspector of Plumbing has made inspections at Barberton, Bellaire, Findlay, Kent, Lima, Mansfield, Oxford, Rossford, Salem, Tiffin and Urbana; and accepted tests made in certain buildings at Circleville, Crestline, Columbus (State Institution for the Blind and the State Serum Farm), Dayton, Elyria, Hamilton, Kenton, Lima (State Hospital) Marion, Martin's Ferry, Middleton, Oxford (Miami University),

Piqua, Troy, Wapakoneta and Zanesville. Tests were made in buildings at Findlay, Tiffin and Urbana. When found necessary changes were recommended.

Orders were issued to the owners for necessary changes in the plumbing of certain buildings in Barberton, Bellaire, Circleville, Cuyahoga Falls, Dayton, Franklin, Lima and Miami University at Oxford.

Certificates of approval were issued to owners of certain buildings in Circleville, Cuyahoga Falls, Franklin (Ohio Electric Station), Lima, and four buildings at Miami University, Oxford.

The Inspector's reports may be found on a subsequent page.

Since the last report 90 inspections have been made by a representative of the Board and 51 different places visited.

In accordance with instructions, Miss Margaret Richter has been employed to succeed Miss Hazel Cameron, who resigned from the laboratory force.

OPINIONS OF THE ATTORNEY GENERAL.

The Attorney General was asked for an opinion relative to the authority of a municipal council to deny to a board of health, or health officer serving in lieu thereof, an appropriation of money to meet expenses incurred in the performance of its duties and to meet the compensation of the health officer, or other paid employees; or to refuse to pay such necessary expenses when properly certified as provided by law. He held that the duty of council to appropriate for these expenses is *mandatory* and cannot be ignored or avoided by that body.

The Attorney General also rendered an opinion to the effect that a member of a state board can receive per diem for time spent in attending to Board's business, but cannot receive a per diem compensation for time spent going to or returning from a meeting or other business of the Board.

The Attorney General was asked whether the initiative and referendum applied to the power or authority of a municipal council to raise funds for immediate use in compliance with an order from the State Board of Health for municipal improvements, given under authority of Sections 1249-1262 inclusive of the General Code.

He held that an ordinance passed in pursuance of the order of the State Board of Health to raise funds to comply with such order is a *duty* devolving upon council, and not a power delegated in the sense that it may or may not be used at the discretion of council. It being, therefore, a positive duty upon council and Section 1259 of the General Code, providing further that bonds issued under said section shall not be submitted to a vote, he was further of the opinion that such ordinances are not within the purview of Section 4227-2 of the General Code.

An opinion has been asked as to the authority of the State Board of Health to approve a site for the sewage disposal plant for the city of Cleveland, said site being located within the incorporated village of Newburg Heights.

NOVEMBER 21st MEETING.

COMMUNICABLE DISEASES.

Smallpox.

Since my last report but twelve cases of smallpox have been reported. These were, 2 in Cincinnati, 7 in Tiffin, 1 in Toledo, and 2 in Newton Township, Miami County.

October 30th, upon request of the health officer, the epidemiologist was sent to Tiffin to investigate an outbreak of smallpox. His report may be found on a subsequent page.

Diphtheria.

During the month of October an unusual number of cases of diphtheria was reported in several of the large cities. These were:

Cleveland, 596 cases, 16 deaths.
Dayton, 128 cases; 6 deaths.
Youngstown, 142 cases; 10 deaths.
Cincinnati, 95 cases; 6 deaths.
Toledo, 71 cases; 9 deaths.
Akron, 67 cases; no deaths.
Columbus, 52 cases; 7 deaths.
Hamilton, 28 cases; 1 death.
Lorain, 28 cases; 1 death.

The disease has been prevalent over the entire state but has not reached epidemic proportions anywhere except in Scioto County and some of the bordering townships. In this district the disease is now well under control.

Scarlet Fever.

On October 10th, 1912, a physician at Minerva telephoned the Secretary that they were suffering from an outbreak of scarlet fever and wanted some one to come to Minerva to make an investigation. A letter was immediately addressed to the health officer asking for a report of conditions. He replied that the schools, picture shows, etcetera, had been closed. October 19th, the same physician again telephoned, reporting fourteen cases and stating that proper precautions were not being enforced. Dr. D. F. Banker, one of our medical inspectors, was sent to Minerva on October 22nd. He found that fourteen cases had been

reported to date. The cases were very mild and were quarantined. The health officer was given advice in regard to his duties and the physicians of the community were urged to report all cases promptly. Our inspector was of the opinion that if a strict quarantine be maintained, the schools could be opened in another week.

Typhoid Fever.

November 7th, the epidemiologist was sent to Weston, Wood County, to investigate an outbreak of typhoid fever. His report may be found on a subsequent page.

Acute Poliomyelitis.

November 14th, by arrangement of the Secretary, the epidemiologist went to Greenville to address the Greene County Medical Society on the subject of acute poliomyelitis.

Since my last report the following cases of acute poliomyelitis have been reported.

<i>County.</i>	<i>Place.</i>	<i>Cases.</i>	<i>Deaths.</i>
Clark	Springfield	1	..
Cuyahoga	Cleveland	13	1
Darke	Greenville	2	1
	Twin Township	1	..
Delaware	Delaware	1	..
Erie	Sandusky	6	1
	Vermilion	1	..
Fairfield	Lancaster	1	..
Franklin	Columbus	5	1
Geauga	Auburn Township	1	..
Logan	Bellefontaine	5	5
Lorain	Lorain	5	..
Perry	Greenford	1	..
Ross	Chillicothe	3	1
Summit	Akron	1	1
	Barberton	1	..
Tuscarawas	Canal Dover	1	..
Van Wert	Van Wert	1	..
Warren	Franklin	1	..
		51	11

The experimental work on acute poliomyelitis being conducted in the laboratory under the direction of the Secretary is progressing quite satisfactorily, and while no definite results have yet been obtained which warrant publication, it is hoped that in the near future a report of important findings may be made. The Department of Zoology at the Ohio State University is still co-operating with us and Professor Osborn, head of the department, has detailed one of his post graduate students, Mr.

C. K. Brain of Cape Town, South Africa, to devote most of his time to the entomological side of this investigation. Mr. Brain has had extensive experience with insect-borne diseases prevailing in Africa, and the Secretary considered the Board extremely fortunate in securing his services.

Under date of July 22nd, 1912, by direction of the Secretary, a circular letter was addressed to all health officers in the state, calling attention to the various sections of the General Code of Ohio requiring that communicable diseases be reported to them, and by them in turn to the Secretary of the State Board of Health. At that time also a sufficient supply of report cards was enclosed. An effort is being made to secure more complete reports of the contagious diseases and marked progress is shown in this work. There are, however, a large number of localities from which reports are not received. Under date of November 11th another communication was sent, calling attention again to this requirement, and urging the local authorities to co-operate in this work. The subsequent procedure will consist of sending a card of inquiry to each locality in the state that fails to report contagious diseases twice a month. It is hoped that ultimately a complete survey of the prevalence of communicable diseases in the state may be secured on the 1st and 16th of each month.

October 23rd and 24th the chief engineer and the principal assistant engineer attended the annual conference in Cleveland of the Great Lakes International Pure Water Association, held jointly with the National Association for Preventing the Pollution of Rivers and Waterways. Distinguished sanitary engineers and medical men were present. It is hoped to stimulate, during the coming year, legislative action that will prevent in a large measure the pollution of the Great Lakes basin.

Bense Propositions.

Orders submitted to the Governor and the Attorney General for their approval, requiring the village of Shelby to provide adequate purification for the sewage of that village, and the village of Plymouth to purify its water supply, have been approved and have been sent to the proper officials.

Geneva and Fostoria authorities have been cited to appear at this meeting in regard to sewage disposal, and the Defiance Water Company and city officials have been asked to confer with the Board in regard to improvement of the water supply of that city.

The council of Marysville has passed resolutions authorizing the employment of an engineer for preparation of plans for sewage purification works, and R. Winthrop Pratt has been engaged as consulting engineer.

PROPOSED OR ADDITIONAL WATER SUPPLIES.

East Columbus, Hubbard and Jeromeville were visited relative to proposed water supplies. Report has been prepared for consideration at this meeting on an additional water supply for Chagrin Falls.

At the September 12th meeting of this Board it was voted to require The Mahoning Valley Water Company to present within 60 days (November 12th) plans for the purification of that part of the water supply for Struthers and East Youngstown used for domestic purposes. November 11th, David M. Wise, the engineer for the company informed the Secretary that he had been instructed to proceed in the preparation of plans and would try to have them approved by the directors of the company before the November meeting of the State Board of Health, but if unable to do so would have the plans ready by the December meeting of the Board.

The director of public service of Sandusky has notified the Secretary that on November 4th, 1912, council passed a resolution instructing him to accept the conditions of the Board's approval of proposed sewers for Mill Creek District and District No. 13; and that he had instructed the chief engineer to prepare the necessary design and estimate of cost for the extension of the water works intake pipe to a suitable location in Lake Erie.

EXISTING WATER SUPPLIES.

Ashland, Dalton, Mansfield, Medina and New Lexington were visited by one of the engineers and the existing water supply was inspected.

Report upon recent examination of the water supply of Bowling Green, states that the wells were found to be satisfactorily located and are producing a water of excellent character from a sanitary standpoint. It is, however, very hard and contains a high iron content. The iron imparts to the water a turbidity, and causes trouble in the distribution system. The authorities were advised to consider the installation of a deferrization plant to remove the iron from the water.

Report upon recent examination of the public water supply of Bluffton states that the supply is at present obtained from a drilled well installed in 1910 without the knowledge or approval of the State Board of Health; and that there is an emergency supply, also used for boiler purposes, taken from a quarry pond. The quality of the supply obtained from the well is satisfactory from a sanitary standpoint at present, though its normal characteristics are not entirely favorable. The surroundings of the well are not all that might be desired, and the authorities were urged to have a suitable ordinance enacted, providing that all privy vaults and cesspools within a distance of 500 feet be made watertight. The sole dependence of the regular water supply being placed

upon the well which has been installed, they were also advised that a second well should by all means be provided, to make the use of the emergency supply unnecessary at any time.

A general examination has been made of the water purification plant at Bucyrus. The examination revealed the fact that the plant is operating at its ultimate capacity to produce the water required for the city. Citizens complain that the water supplied is frequently turbid and impregnated with tastes and odors. Analytical examinations show that the water from the clear well at the plant has a noticeable turbidity, while that from the filters is perfectly clear. The attention of the water company was called to the importance of filtering all of the water pumped into the mains and of the danger of temporarily supplying unfiltered water; and they were advised that in order to provide a plant which will at all times produce a sufficient quantity of well purified water, it seems necessary that the plant be considerably enlarged; and immediate steps should be taken to that end.

An examination was made of the public water supply at Clyde with reference to the pollution of well No. 1. Analyses of samples taken from this well when pumped at a high rate, indicate that the well is grossly polluted by wastes which introduce objectionable physical characteristics, and a high content of organic matter and chlorine. The nature of the pollution is such as might be introduced by the wastes from several kraut factories within a radius of one-half mile. It is understood that the wastes from these factories are disposed of by discharging them into drilled wells penetrating the same formations from which the water supply is drawn. Although the polluted well shows no marked evidence of the presence of disease-producing organisms, the analyses would indicate the danger of serious contamination which would result if sewage should be disposed of in the same manner as the kraut wastes. The open structure of the limestone formations permits of rapid and direct passage of the water to the wells. The water supply is, therefore, constantly in great danger of serious contamination. The authorities were advised that the casing of well No. 1 should be lowered to cut off the shallower waterbearing strata, and that immediate steps should be taken to stop the pollution of the underground waters resulting from the improper disposal of wastes through wells. Future examinations of the water supply will be made, and it may be found necessary to abandon the existing wells and install new wells at a more satisfactory location.

Report has been made upon a general examination of the water supply of Continental. This supply has never received the approval of the State Board of Health. The wells are very poorly located, being near the central portion of the village and the immediate surroundings are maintained in an extremely improper condition. The wells are subject to the danger of pollution from several sources, the principal one of which is a privy vault maintained by the Nickel Plate Railroad within

50 feet of one of the wells. Analyses indicated that the water should be viewed with suspicion and can be considered safe for drinking purposes only after boiling. The authorities were advised that the present wells should be abandoned and a new source at a satisfactory location secured. Since the investigation, however, the health officer has notified the Secretary that the privy mentioned above has been abandoned and the vault filled with cinders.

Upon recent examination the water supply of Gallipolis was found to be of entirely satisfactory quality from a sanitary standpoint.

An informal report has been made upon the existing water supply of Napoleon. This supply is at present derived from the Maumee River and is furnished to consumers without treatment. The river receives considerable sewage from communities above Napoleon and will no doubt continue to do so for a number of years, and the water supply is likely to be affected at times, especially during times of upstream winds. The physical characteristics of the water are objectionable and the use of small household filters does not improve the quality materially from a pathogenic standpoint. Analytical results show the water to be unsafe. The authorities have been cited to appear at this meeting to show cause why they should not be required to improve the present water supply.

During the past summer the engineering department made several examinations of the water supply of Waverly, and the softening and de-ferrization plant which is used to improve the supply. The results indicated that the water has deteriorated as regards its mineral constituents. The chlorine and hardness content have increased considerably since the wells were installed. The quantities of chemicals used to soften the water are inadequate to accomplish a marked improvement and owing to the excessive hardness of the water it cannot be said that a satisfactory softening is practicable. The authorities were advised to at once confer with The Roberts Filter Manufacturing Company, who installed the plant, with a view to having an examination of the plant made and directions given for its proper operation. It may be recalled that in 1910 when the supply was approved by the Board, the attention of the authorities was called to the fact that the Board had advised locating the wells at the easterly boundary of the village, which seemed to be a more satisfactory location; or that the quality of water obtained from the Norfolk and Western Railway Company's well was entirely satisfactory, while the wells proposed by the village were undesirably located.

Upon examination of the water supply at Wellington the quality was shown by analyses to be unfit for domestic purposes. The authorities were notified that they are violating the conditions of the Board's approval of April 27th, 1898, which were that the water should be used "exclusively for fire, street and manufacturing purposes." The supply is being used to some extent at least for domestic purposes, in violation of an ordinance designed to prevent such use, and inasmuch as this

cannot be prevented they were advised that it is the duty of the village to properly purify the supply.

PROPOSED SEWERAGE AND SEWAGE PURIFICATION.

One of the engineers visited Cleveland relative to proposed sewage purification for a real estate addition there, Canal Dover to assist the authorities in selecting a site for sewage purification works, East Columbus and Sandusky in regard to proposed sewerage, Rising Sun in regard to proposed sewerage for a school house, and Forest relative to the construction of a county storm sewer. A report upon the latter sewer has been prepared for consideration at this meeting.

Upon request of the city solicitor, one of the engineers visited Canal Dover to examine two sites proposed for location of sewage purification works. The authorities were notified that no definite site should be chosen until the city has had the problem completely studied and the determination of the type of plant has been reached. As it appears impossible for this study to be completed prior to November 15th, the time set for the submission of plans, an extension of time will have to be granted and the director of public service has made such a request.

EXISTING SEWERAGE AND SEWAGE PURIFICATION.

The sewage purification plants at Ashland and Marble Cliff were inspected, and sewerage conditions at Alliance and Newcomerstown were investigated.

One of the engineers recently visited Hubbard to learn the status of construction of sewerage and sewage purification works. The plans were approved in September, 1910, but the time limit of approval, January 1st, 1912, has expired. It was learned that a portion of the sewer system has been constructed but is not used on account of the absence of a suitable outlet, and no provision has been made for the installation of a sewage disposal plant. Delay in construction of the sewers was caused by the bankruptcy of the contractor, which necessitated the reawarding of the remainder of the sewer construction. The village was notified that a renewal of approval of the plan for proposed sewage disposal works would be required, and the engineer has been instructed by council to take the matter up with the State Board of Health.

An examination has been made of the sewage purification plant at Marble Cliff. While the plant as a whole was producing a satisfactory treatment of the sewage, it was found that a greater degree of attention to its operation is required. The tanks needed cleaning. The automatic dosing apparatus was found to be out of order. The surface of the contact filters and final filters needed cleaning and releveling. The authorities were advised to write to the manufacturers requesting them to place the apparatus in proper working condition; and to take imme-

diated steps to place the plant in proper condition so that its efficiency may not be interfered with.

Upon examination, some defects were noted in the recently constructed sewage purification plant at New Bremen, which were pointed out to the authorities. Later another examination will be made with a view to studying the efficiency of the plant.

Upon recent examination of the sewage purification works at St. Marys, it was found that the disposal of the sewage of the city is not being properly accomplished. A break in the main sewer at the point where it passes into the canal permits the entrance of a large amount of canal water which interferes with the proper treatment of the sewage flow. The authorities were notified that this break should be repaired immediately and, if possible, a cast iron pipe line should be used in crossing the canal. It was also found that the automatic dosing siphons were not operating satisfactorily, and that the sand filters and sludge bed were in need of repair. The authorities were advised to take up the matter of the automatic siphons with the manufacturers with a view to their readjustment and repair; and that the said filters should be cleaned, leveled and maintained in this condition to secure proper results. Also that the sludge filter is inadequately drained and is probably in need of entire reconstruction, including the placing of a good grade of filtering material.

October 12th, 1912, the chief engineer approved the general procedure of installing a watertight cesspool and leaching cesspool for a new school building at Bettsville, submitted August 23rd, 1912, by S. H. Shively, architect for the board of education of that village.

NUISANCES.

Upon recent examination of the pollution of Alum Creek it was observed that the sewage from St. Marys of the Springs is discharged into the stream. Cesspools are provided for the retention of the solid matter, but these are in need of cleaning. The attention of the authorities was called to the matter.

It was found that the principal pollution of the creek resulted from sewage discharged from Columbus sewers. A decided and much complained of nuisance is caused in the creek below the Main Street outlet. Data was secured showing that during the first nine months of 1912 the east side pumping station was operated a total of seventy-four days. During the remainder of the time the sewage flowed into Alum Creek. Below the Main Street outlet and within the city of Columbus a slaughterhouse discharges its wastes into the creek. The health officer was requested to call the attention of the council to this matter in order that funds may be secured to construct sewers and improve pumping facilities to prevent a further occurrence of the nuisance.

The attention of the health officer of Bexley, a suburb of Columbus, was also called to the condition of the creek caused by the discharge of sewage and other wastes within that village. It was also observed that the flow in the creek is restricted by numerous obstructions in the channel of the stream and it was suggested to the Franklin County Commissioners that they examine the stream with a view to determining the practicability of cleaning the channel.

Late in September a petition was received from residents of Rossford, Wood County, complaining of the condition of Grassy Creek. An investigation has been made by one of the engineers, who found the conditions as set forth in the complaint, but the examination indicated that the creek should be deepened and widened to effect a remedy, and such work is under the jurisdiction of the county commissioners. The creek is, however, polluted by sewage from Rossford and the petitioners were informed that the State Board of Health is empowered to abate such conditions and will make an investigation if the complaint is submitted by the local authorities.

* * *

The Secretary wishes to direct the attention of the Board to the fact that for the past several weeks, since a conference was held between a committee of the Board and the executive committee of the Ohio Society for the Prevention of Tuberculosis, the representatives of this association have been quite active in arranging for their campaign before the legislature, to secure \$50,000 for two years to make it possible to create within the organization of the State Board of Health a Division of Tuberculosis. The joint committee on public health and legislation of the State Medical Association has also placed itself on record as favoring the placing of the tuberculosis campaign in the hands of the State Board of Health. Dr. Warner and the Secretary appeared before the joint committee of the Ohio State Medical Association, and also sat in conference with the executive committee of the Ohio Society for the prevention of Tuberculosis, at which time the committee agreed to use all possible means of securing these appropriations for the State Board of Health. The Executive Secretary of the Ohio Society, Dr. Paterson, has held a number of conferences with the Secretary during the past month in regard to efficient means of securing the necessary legislation.

THE STATE INSPECTOR OF PLUMBING.

Twenty-nine inspections and a number of tests were made by the State Inspector of Plumbing. Inspections were made at Bremen, Circleville, Columbus (State Institution for the Blind, and Norfolk and Western Shops), Franklin, Kent, Mt. Sterling, Piqua, Sabina and Washington C. H. At Franklin it was found that the order issued had not

been complied with; changes made at Kent were disapproved and changes were recommended in the Plaza Hotel at Piqua.

The Inspector accepted tests made in certain buildings in Bellaire, Lima, Mansfield, Marion, Martins Ferry, Ottokee (Fulton County Infirmary) Tiffin and Westerville.

Orders were issued to owners for necessary changes in plumbing in the following places: Circleville, Franklin (Electric Station), Lima (State Hospital), Ottokee (Fulton Infirmary), Tiffin and Westerville.

Certificates of approval were issued to owners of certain buildings in Defiance and Martins Ferry.

Letters have been sent to the thirty cities having a population of over 8,000, requesting the board of health to appoint an inspector of plumbing, and when necessary establish a fee system to make the office self-sustaining.

At the May 9th meeting the Board adopted a resolution, offered by the Engineering Committee, directing the State Inspector of Plumbing to submit a compilation from the various building codes of the older cities and states, with respect to the use of wrought iron and steel pipe for connecting sanitary apparatus, in order that the Board might have more light upon the matter than that conveyed by the code itself. Such a report was made and submitted to the Engineering Committee. The committee has approved the recommendations of the State Inspector of Plumbing "that plumbers be permitted to use, as in conformity with the requirement of the State Building Code, mild or soft steel pipe as a substitute in lieu of wrought iron pipe.

Forty-one places have been visited and 55 inspections have been made by a representative of the Board.

DECEMBER MEETING.

COMMUNICABLE DISEASES.

As a result of the second communication addressed to the cities, villages and townships that had disregarded the first letter calling attention to the sections of the General Code requiring all physicians to report cases of contagious and infectious diseases, quite a number of those who had previously failed to report began to send in reports. The Secretary intends to pursue vigorously this campaign until absolutely accurate results are at hand twice each month.

Reports have been received for the month of November as follows:

	Cities.		Villages.		Townships.		Total.	
	C	D	C	D	C	D	C	D
Cerebro-Spinal Meningitis	6	6	0	0	3	1	9	7
Chickenpox	428	0	35	0	55	0	518	0
Diphtheria, Membranous Croup	1,597	76	163	17	129	7	1,889	76
Measles	625	5	115	0	170	0	910	5
Scarlet Fever.....	394	21	42	0	141	1	477	22
Smallpox	32	1	0	0	0	0	32	1
Trachoma	3	0	0	0	0	0	3	0
Typhoid Fever.....	132	8	43	1	36	7	211	16
Whooping Cough.....	92	3	52	0	45	1	189	4

Diphtheria.

The greatest number of diphtheria and membranous croup cases were reported in Cincinnati; 603 cases and 25 deaths. Cleveland reported 490 cases, with 22 deaths; Columbus 81 cases and 5 deaths; Dayton 77 cases and 3 deaths; Toledo 77 cases and 3 deaths; Coshocton 55 cases, Springfield 49 cases and 7 deaths; Zanesville 43 cases, Portsmouth 35 cases and 1 death; Hamilton 30 cases, 4 deaths, and Youngstown 27 cases and 1 death.

December 7th, the epidemiologist was sent to Leesburg upon request, there being a question as to the diagnosis of the disease prevailing there. He found eight cases of diphtheria and four of scarlet fever. His report may be found on a subsequent page.

December 9th, Dr. Hasencamp investigated a complaint that cases of diphtheria and scarlet fever were present in Washington Township, Lucas County (West Toledo), and that proper quarantine was not being enforced. He found two cases of diphtheria and seven of scarlet fever. The health officer had permitted one man, who was engaged in outdoor labor, to pursue his work, but used extreme caution where he had modified the quarantine after fumigation. The houses had not been placarded, though strict orders had been given that no children should go out or anyone go into the house for fifteen days. The health officer was advised to secure placards at once and in the future to placard all houses in which there were cases of contagious disease.

Acute Poliomyelitis.

No investigations have been made on account of acute poliomyelitis. Since my last report 13 cases and 3 deaths from this disease

have been reported. These were distributed as follows: Bellefontaine 2, Cleveland 3 cases, 1 death; Coldwater 2, Columbus 2, Corning 1, Marion 1 case and 1 death, Toledo 1 case, and Wapakoneta 1 case.

Measles.

The greatest number of cases of measles occurred in Cincinnati, 276 cases and 3 deaths being reported. One hundred and fifty cases were reported in Martins Ferry, 103 cases and 2 deaths in Toledo, and 76 cases in Cleveland.

Scarlet Fever.

Of the 342 cases and 20 deaths from scarlet fever the greater number were in Cleveland, that city reporting 124 cases and 13 deaths. Cincinnati reported 75 cases and 2 deaths, Columbus 52 cases and 1 death, Dayton 18 cases, Mansfield 43 cases and 2 deaths and Toledo 56 cases and 2 deaths.

A report was received from Wauseon stating that scarlet fever was prevailing in Freedom Township, Henry County, and that no precautions were being taken to prevent its spread. Accordingly, on November 19th, Dr. Chapman, medical inspector, was sent to Freedom Township to make an investigation. He found that the cases of scarlet fever were confined in one school district, a German Lutheran School. The disease was present in but two families; the report of the outbreak having been greatly exaggerated as to numbers and quarantine regulations being enforced. He advised the fumigation of all the school houses at the end of the week and that they be closed from Friday to Monday.

December 1st, upon request of the health officer of Granger Township, Medina County, G. T. Dunsha, the epidemiologist visited that locality to determine the nature of an infectious disease said to be prevailing there. Three children were said to be suffering with scarlet fever, or German measles. His report may be found on a subsequent page.

Smallpox.

Of the 32 cases of smallpox, 13 were reported in Tiffin, 13 in Zanesville, 4 in Toledo, and one each in Cincinnati and Cleveland. One death occurred at Cleveland.

November 30th, upon request of Dr. Sutton and the health officer, Dr. G. W. McCormick, the epidemiologist visited Zanesville to investigate an outbreak of smallpox. His report may be found on a subsequent page.

Trachoma.

The three cases of trachoma reported were in Cleveland.

Typhoid Fever.

Of the 211 cases of typhoid fever, 39 cases and 2 deaths were in Toledo, 20 cases and 3 deaths in Cleveland, 19 cases in Cincinnati, 18 cases in Marysville, 18 cases and 1 death in Youngstown, 9 in Zanesville, and the others were scattered throughout the state.

November 29th, at the request of Dr. C. W. Hoopes, health officer, the epidemiologist visited Marysville to investigate an outbreak of typhoid fever. His report may be found on a subsequent page.

Tuberculosis.

The Secretary, in conjunction with Dr. Robert G. Paterson, executive secretary of the Ohio Society for the Prevention of Tuberculosis, has been devoting some time and attention to the plans for the coming legislative campaign to secure an annual appropriation of \$25,000 from the General Assembly for the creation of a Division of Tuberculosis. Bills have been drafted, and a number of persons interested in the coming legislature have been interviewed. The indications are that this proposition, as well as the request for the appropriation for a survey of occupational diseases in the state and the general appropriations for the State Board of Health, will be favorably received by the majority of the legislators.

BENSE PROPOSITIONS.

One of the engineering department investigated the complaint concerning the contamination of the Hocking River in Fairfield County, Berne Township, by the wastes from the Leather Board Works at Lancaster. It was found that the stream is noticeably polluted by these wastes. The sewage from the city also contains manufacturing wastes which contribute to the pollution of the stream. In order to learn definitely the cause of the present conditions of the stream it will be necessary to carry on a more extensive study.

While in Bellaire, the principal assistant engineer in company with the mayor, director of public service and consulting engineer, inspected the water purification plant. It was found that it will be necessary to properly strengthen the sedimentation basin and to remove the filtering material and clean and grade the same before the plant can be placed in operation. The consulting engineer was instructed by the city officials to submit an estimate of cost for properly repairing and completing the plant, and a report will be made to the State Board of Health.

On a recent visit to Bowling Green one of the engineering department learned that the council had passed the necessary legislation to construct the proposed sewers in accordance with the Board's approval of February 15th, 1912, with an outlet in Poe ditch at a suitable point for

the construction of a sewage purification plant and this will be completed in time to provide sewerage facilities for the administration building of the State Normal School. It was also stated that the city is making arrangements to provide funds for the construction of the sewage purification plant which the condition of the Board's approval requires to be started before April 1st, 1914.

The order was prepared and submitted to the Governor and the Attorney General, requiring the city of Fostoria to present plans for approval, for improvements in the sewage disposal plant, and to make such improvements within six months from the date of the approval of the order by the Governor and the Attorney General, and was approved by them December 21st, 1912, and sent to the authorities at Fostoria.

Two of the engineers visited Ironton for the purpose of making an examination of a recently completed test well installed in the bed of the Ohio River. A large number of samples were taken during the progress of a pumping test and a complete report is being prepared.

PROPOSED OR ADDITIONAL WATER SUPPLIES.

The following places were visited by one of the engineering department relative to proposed or additional water supplies: Barber-ton, Kenton, Mt. Vernon State Sanatorium, New Concord and Youngs-town. The last named place was visited and a conference held in regard to the submission of plans for a proposed water purification plant to be installed by The Mahoning Valley Water Company to purify the water supplied to Struthers and East Youngstown.

December 2nd, Mr. A. B. Mathews, city solicitor, came to Columbus and held a conference with the Secretary relative to improving the water supply and installing a system of sanitary sewers at Wellington. He stated that the city is unable to install treatment works, as recommended by the Board. He was referred to the chief engineer for advice in regard to improving present conditions.

EXISTING WATER SUPPLIES.

The existing water supply was examined at Andover, Clyde, De-fiance, Conneaut, Fremont, Ironton and Napoleon, and a report has been prepared on Ironton for consideration at this meeting.

The recently installed water supply at Andover has been examined and the analyses indicate that the water is of excellent quality from a sanitary standpoint, and one entirely suited for domestic use; the small iron content, which imparts a slight turbidity, is the only objection. When the Board approved the site for this public water supply a condition was attached requiring that detailed plans for the development of the supply be submitted to and receive the approval of the State

Board of Health before the works were placed in operation. These plans were never submitted and the authorities have been asked to immediately forward complete detailed plans and specifications. Their attention was also called to the importance of maintaining records.

A recent examination of the public water supply of Ashland revealed that the supply is obtained from eight drilled wells in the valley of Long Creek, which, in their present condition, do not yield a sufficient quantity for the needs of the city. The quality of the supply, as indicated by analysis, is satisfactory from a sanitary standpoint. The authorities were urged to make a comprehensive and permanent improvement in the water supply and to submit the question to an experienced and competent engineer with a view to securing suitable plans for its development.

It is understood that during the summer of 1913 Camp Perry will be attended by a large number of troops and rifle teams from all parts of the country and abroad, when the population will at times reach 8,000 to 9,000. The existing water and sewage purification plants provide for an average population of 2,500, although on several occasions a population of 4,000 has been served for short periods. The attention of the Adjutant General has been called to the absolute necessity of enlarging both plants and he has been advised to employ a competent sanitary engineer to design the necessary improvements and submit plans to the State Board of Health.

The public water supply of Fremont has been examined and samples collected, the analyses of which show the supply to be entirely unfit for domestic use. A large degree of pollution is indicated and the water must be classed as a dangerous one for drinking purposes. The mayor and council were advised that immediate steps should be taken to secure an improved supply. They were also advised if the Sandusky River is selected as a permanent source of supply it will be necessary to install a suitable purification plant to improve its sanitary quality, and if wells are selected as the sole source it will be necessary to install a softening plant to provide satisfactory water. Council was required to take up for consideration the question of improving the water supply and advised that the matter should be studied by a water supply expert in order that the best possible supply may most economically be secured.

An investigation has been made of the existing water supply of Garrettsville with special reference to the iron removal plant. It was learned that the water derived from the public supply wells after passing through the iron removal plant still contains an objectionable amount of iron, as shown by the results of analyses of samples collected at the time of inspection, and it was deemed advisable to make confirmatory analyses. These analyses indicate that the plant is doing better work than at the time of the last examination (in October), but there is still an objectionable amount of iron in the samples from the distribu-

tion system. The authorities were advised that the entire distribution system should be flushed to remove iron deposits which had accumulated in the pipes. The plant was found to be operated in a proper manner though certain details regarding the filter should be changed. The sand is probably well impregnated with iron deposits and they were advised to remove and replace the material and instructed in regard to the manner of procedure in making the desired improvement.

The results of examination of samples of the water supply of Marysville indicate that the supply is of exceptionally good quality from a sanitary standpoint, its organic and bacterial contents being low. The mineral constituents are, however, extremely objectionable as demonstrated by the high alkalinity, incrustants and iron content. The total hardness of the water is excessive and the iron content is such as to impart a very high turbidity to the water. The water company is considering the feasibility of installing a plant for the removal of the iron, which would undoubtedly bring about a marked improvement in the water, especially as regards its appearance and effect upon plumbing fixtures. The company was urged to give due consideration to the reduction of the hardness of the water in connection with the plant designed for the removal of the iron. A combined softening and deferrization plant would greatly improve the chemical quality of the water.

A report has been made upon recent examination of the public water supply of Middleport and Pomeroy. It was found that several improvements were needed in order to place the plant in proper running order, especially in the equipment for the coagulant feed. The water company was advised to employ a consulting engineer to prepare plans for the apparatus and to give advice relative to the operation of the plant. Analyses showed the presence of intestinal organisms. It was difficult to account for the poor efficiency of the filters but it appeared that steps should be taken to learn the source of the trouble.

The company has employed a consulting engineer to provide for improvements at the plant and it was suggested that he also thoroughly examine the operation of the plant with a view to securing better bacterial removal.

In compliance with the first condition of the Board's approval of August 15th, 1912, of the proposed water supply for the New Concord Real Estate Company, a test has been made which indicates that the quantity of water available is sufficient for the present needs of the village, and that the quality is satisfactory. The bacterial findings were somewhat unfavorable, due no doubt to the newness of the installation.

The recently completed water works system at New Lexington was inspected by one of the engineering department, and found to have been installed practically in accordance with the plans approved. Results of analyses of samples of the water collected indicate that the

water obtained is unsatisfactory for general purposes. The bacterial content is objectionable and owing to the depth of the well it is difficult to account for the result. The chemical characteristics were especially unfavorable, the chlorine and iron contents being abnormal. The former gives a brackish taste, which will cause complaint, and the iron is sufficient to stain plumbing fixtures. At the time the wells were last sampled, July 1st, 1912, the chlorine content was low and the great increase which has taken place would indicate that a water of entirely different source and character is obtained. The indication is that the chlorine content may further increase as the result of continued pumping. The authorities were advised to seek a new and more satisfactory supply.

Report upon recent examination of the water supply of Toronto revealed the fact that the supply is obtained from the Ohio River without purification. Analyses of samples from the river taken at points on the distribution system indicate that the supply is of dangerous character and entirely unfit for domestic consumption. The water was found to be unsatisfactory in its physical characteristics and grossly polluted. The board of trustees of public affairs was advised that immediate steps should be taken to provide for an improvement in the water supply as the community is in danger of a typhoid epidemic from use of polluted water.

December 14th the chief engineer approved samples of filtering material, submitted by William B. Scaife Sons and Company of Pittsburgh, December 11th, for The Provident Coal Company near St. Clairsville, fulfilling the first condition of the Board's approval of a proposed water purification plant given October 23rd, 1912.

OHIO RIVER INVESTIGATION.

The following places were visited by two of the engineers who are making an investigation of the public water supplies of the communities on the Ohio River; Chester, W. Va., East Liverpool, Steubenville, Mingo Junction, Bellaire, Wheeling, W. Va., Benwood, McMechan, W. Va., Wellsville, Toronto, Martins Ferry and Bridgeport, and Moundsville, W. Va.

A complete report of the investigation is in progress of preparation and it is hoped that data will be secured which will show the necessity of extensive improvements in the water supply of the Ohio River communities visited.

PROPOSED SEWERAGE AND SEWAGE PURIFICATION.

Crestview, a suburb of Columbus, Fremont, Mantua and Toledo (Lucas County Sewer District No. 2), were visited in regard to proposed sewerage, and Canton relative to proposed sewage purification.

One of the engineering department visited Rising Sun for the purpose of gaining information concerning the proposed sewage treatment plant for the public school building. It was found that the location proposed immediately east of the building is unsatisfactory. It appears that a suitable site could be secured 500 feet northwest of the building and the company that is to install the plant was so notified.

Reports have been prepared for consideration at this meeting on proposed sewerage and sewage purification for the Home for the Aged and Infirm Deaf, near Westerville; on sewerage for Sewer District No. 2, Lucas County, and sewerage and sewage disposal for Wildwood Addition, Adams Township, Lucas County.

EXISTING SEWERAGE AND SEWAGE PURIFICATION.

The existing sewage purification plants at Andover, Alliance and the State Sanatorium at Mt. Vernon were inspected; existing sewerage at Barberton, and sewerage conditions at Cleveland and in the immediate vicinity of that city were inspected by a representative of the engineering department.

One of the engineering department inspected the sewage purification plant for Brooklyn Subdivision No. 2 of the Citizens Land and Improvement Company at Cleveland, plans for which were approved in August of this year. The plant was found to be operating satisfactorily. The effluent from the plant was clear, odorless and non-putrescible. The plant, which consists of an Imhoff Tank, a dosing chamber, two sand and cinder filters and a sludge bed, is entirely covered with the exception of the sludge bed. No nuisance is being created at the present time. The conditions of the Board's approval have been complied with.

A report has been made upon a recent examination of the existing sewerage at Findlay. With the exception of the construction of 2.84 miles of combined sewers in Subdivision No. 5 of District No. 2, the sewerage of Findlay has remained unchanged since the last examination. These sewers, however, were never approved by the State Board of Health. The installation of these sewers has greatly improved conditions in Eagle Creek and Lye Creek, however, and did not involve the establishing of a new outlet in the river. All of the outlets in the Blanchard River were inspected and so far as could be learned no complaints have been made against the discharge of sewage into the river at Findlay. A general plan of the sewerage for this district was obtained from the city engineer at the time of this inspection.

In December Dr. Miller and one of the engineers visited Lakewood to investigate sewerage conditions. The inspection along the lake front showed that 25 or 30 private sewers discharge sewage from residences directly into the lake. Owing to the topographical condi-

tions along the shore it was impossible to make a close examination of the lake for the purpose of learning whether any visible pollution was caused. The authorities were advised that the city should provide proper sewerage for these residences and prevent the maintenance of the private outlets.

The sewage treatment works were examined and found to be seriously overworked by the large volume of sewage contributed by the city. The plant was constructed when the population of the city was considerably less than at present and the greatly increased sewage flow is in excess of what the plant can be expected to treat. The presence of the water works intake of Rocky River a short distance below the outlet from the works makes necessary efficient operation of the plant. The authorities were advised to take up immediately the question of employing a sanitary engineer to recommend improvements.

Investigation of the storm sewers of the city showed that they are misused to a large extent to receive domestic sewage, which should be discharged into sanitary sewers. Council was advised that this practice should be prohibited by ordinance.

The village of Medina is furnished with two sewage purification plants, each of the same design. Upon recent inspection it was found that they were in an extremely rundown condition and the authorities were advised that steps should be taken at once to make extensive improvements. They replied that repairs were being made under the direction of the engineer who built the plant which will place them in good condition. They were again advised of the necessity of submitting plans for the improvement of the plants to this Board.

Recent examination of the sewage treatment plant of the Mt. Vernon State Sanatorium showed that three of the filters had been cleaned and furrowed and the fourth was being cleaned. The sludge bed contained no filtering material, rendering it impossible to remove sludge from the septic tanks. The tanks themselves are badly in need of cleaning and their poor efficiency doubtless has contributed to the failure of the filters to operate properly. The superintendent was informed that it was of the utmost importance that the sludge bed be filled with proper filtering material and the tanks be thoroughly cleaned. It was also observed that the bleach used in disinfecting the sewage effluent is obtained in large barrels. The superintendent was advised that the strength of the chemical is partly spent before use and that the bleach should be purchased in five or ten-pound sealed cans so that the chemical applied may be of standard strength.

SANITARY CONDITIONS.

A representative of the engineering department recently made an inspection of the sanitary conditions at Kenton. He learned that the local board of health is inactive and that inefficient inspection of sani-

tary conditions is being maintained. The importance of having an active board of health and that it be given the assistance of a sanitary policeman to detect and abate unsanitary conditions was urged upon council. Attention was also called to the necessity of providing means for collection and disposal of the various wastes in order to maintain good health conditions.

THE STATE INSPECTOR OF PLUMBING.

Sixteen inspections were made by the State Inspector of Plumbing since the last report. Inspections were made at Ashland, Ashville, Bradford, Bucyrus, Columbus, Lima, Marion, Newark and Salem.

The inspector accepted tests made in certain buildings, at Lima and Salem.

Orders were issued to the owners of the Worley Hotel at Marion and an office building on North High Street, Lima.

The Secretary has inspected the report and receipts of the State Inspector of Plumbing for the month of November and finds that collection have been made to the amount of \$100, making a total of \$690 collected to December 1st. During the month of November, 23 inspections were made, making a total of 296 inspections to date.

Twenty-eight different places have been visited by a representative of the Board, and 36 inspections have been made.

The President appointed the following members of the Finance Committee: Dr. Sutton, Chairman, Dr. Warner and Dr. Grube.

The President appointed Dr. Grube a delegate to represent the Board at the Second National Conference on Housing, held in Philadelphia, December 4th, 5th and 6th, 1912. Dr. Grube attended the conference and a copy of his report has been furnished the members of the Board.

The President appointed Mr. Hill a special committee to attend the conference of the United States and Canada officials on the pollution of the international waterways between the two countries at Buffalo, December 17th, 1912. Mr. Hill attended this conference and a copy of his report has been furnished the members of the Board.

PUBLIC WATER SUPPLIES

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REPORT ON PROPOSED NEW WATER SUPPLY FOR AKRON.

On March 4th, 1912, a request for approval of a proposed new water supply for Akron was received from Mr. R. M. Pillmore, director of public service of the city. The request was accompanied by a report on an improved water supply for the city of Akron, submitted in August, 1911, by Messrs. Frank A. Barbour and E. G. Bradbury, consulting engineers for the city. On March 6th, 1912, the chief engineer made an examination of the proposed source of supply. After an examination of the report of the consulting engineers to the city, the following report was prepared:

Akron, a city with a population of 70,000, is located in Summit County on the Cuyahoga River at its confluence with the Little Cuyahoga River. The city is experiencing a flourishing growth, and during each decade since 1890 the average increase has been sixty per cent. It is an important manufacturing center and its future development will without doubt be quite active.

Owing to the rapid growth of the city, its public water supply and sewerage facilities have become inadequate for the needs, and for the past year the city has been engaged in preliminary investigations for improving both the public water supply and the sewerage system.

HISTORICAL.

The public water supply of Akron is discussed in detail in the annual report of the State Board of Health for 1906, pages 79 to 83. The water supply was installed in 1881 by a private company. The first supply was obtained from driven wells at a depth of 60 to 70 feet, but these soon proved to be inadequate. About 1885 the Summit Lake supply at present in use was installed. This water was, however, of undesirable quality, and an attempt was made in 1891 to obtain a supply from driven wells near the water works property. These wells were used until 1894 when a shortage in the supply took place and Summit Lake was again employed. In 1904 another attempt was made to secure a well supply, but this also resulted in failure.

In July 1909 a petition under the Bense Act against The Akron Water Works Company was received from the health department of Akron. Following an investigation by a committee of the Board in July, 1909, and a hearing of officials of the city and The Akron Water Works Company in January, 1910, it was voted by the Board "that the improvements or changes recommended in the report of its committee were necessary and should be made, but in view of the fact of the impending suit, which might enable the city of Akron to secure a pure and suitable water supply without action by the State Board of Health, further proceedings in this case be suspended pending the outcome of

said suit." The decision of the Supreme Court in the case was adverse to the city, and in June, 1910, the Board voted to require The Akron Water Works Company to install and place in operation a water purification plant to meet the approval of the State Board of Health, or to secure a new source of supply satisfactory to said Board. This order of the Board was signed by the Governor and the Attorney General, and transmitted to The Akron Water Works Company in October, 1910.

As a result of this order and acting upon an agreement with the city of Akron, The Akron Water Works Company installed during the summer of 1911 a chlorination plant for disinfection of the water supply. This plant has been in operation constantly since that time.

PRESENT SUPPLY.

A brief description of the present supply will be given. The water is obtained from Summit Lake and conveyed in a conduit to the pumping station where it is treated with calcium hypochlorite and pumped directly into the distribution system. Summit Lake is a natural body of water, but its level has been raised by the construction of dikes in order to furnish a feeder for the Ohio Canal. The area of the water surface is about 65 acres, and the lake has a depth in its deepest portions of 50 to 60 feet. The watershed of the lake is small and the supply is largely obtained from springs entering its bottom. The water in the lake is frequently changed owing to the fact that the Ohio Canal passes through it at a rate of approximately 22,600,000 gallons per day.

The population of Summit Lake is rapidly increasing owing to the establishment of industries along its banks and upon its watershed, and also owing to the rapid development of summer hotels and cottages. The water obtained from the lake is now of poor physical quality and at times is dangerously polluted with sewage. The quantity of water available from this source is also limited, particularly by a law recently enacted which prohibits the use by the city of more than fifteen million gallons per day from this source.

For a number of years there has been considerable agitation on the part of the city officials to obtain a municipal water supply, and owing to the fact that the franchise of The Akron Water Works Company expires in 1915 the question has been brought to a decision on the part of the electors. During the past year a bond issue of \$815,000 was voted by the people to purchase the plant and equipment of The Akron Water Works Company. The transfer of the property will be made within a few months, and the city will operate the plant pending the completion of the proposed new water supply. When this has been done, the old supply will be abandoned.

PROPOSED NEW SUPPLY.

The city officials of Akron desire approval by the Board of the general development of a new water supply as outlined in the report of

their consulting engineers. The proposed development will therefore be taken up at this time in only a general way with sufficient detail to make clear the extent and nature of the proposed improvements.

In their report to the city of Akron the consulting engineers have considered possible sources of water supply obtained from the Portage Lakes, the Tuscarawas River, the Little Cuyahoga River, the Cuyahoga River and Lake Erie. Based upon data obtained by extensive surveys and calculations, each of these proposed supplies has been eliminated except that obtained from the Cuyahoga River which is believed by the consulting engineers to offer the best advantages for a permanent supply for the city. The adoption of the Cuyahoga River as the future water supply of the city of Akron was therefore recommended.

The scheme of development of this supply consists in the construction of a dam in the river 1.5 miles above the village of Kent; a conduit leading from the reservoir thus formed to a purification plant and pumping station located 1500 feet west of the river and some 2000 feet from the dam; and a 36-inch steel force main 10.6 miles in length, leading from the pumping station to a distributing reservoir to be placed one-half mile east of the city limits of Akron at a point of sufficient elevation to supply the entire city by gravity.

The Cuyahoga River above the proposed location of the dam has a watershed area of about 214 square miles. The stream has its headwaters in Geauga County, 45 miles northeast of Akron, and it follows a general southwesterly course to the city of Akron, where it abruptly turns to the north and flows to Lake Erie, which it enters at Cleveland. The upper portion of the watershed or that above the proposed dam, consists of rather level land devoted largely to agricultural pursuits. The fall of the stream from its headwaters to Kent is only 7 feet in a distance of 30 miles, and it will therefore be seen that the stream is not subject to rapid fluctuations of flow.

The pollution of the Cuyahoga River above the proposed dam is slight. Upon the watershed are located the villages of Mantua, Hiram Rapids, Burton and Middlefield. Mantua, ten miles above the proposed dam, with a population of 730, has a public water supply and three storm sewers to which about 70 connections have been made for sanitary purposes. One of these sewers discharges directly into the Cuyahoga River and the other two discharge into a dry ditch. Hiram Rapids has no water supply nor sewerage system. Burton, twenty-five miles above the dam, with a population of 650, has no water supply although one is contemplated, but has two private sewers serving some 75 persons, one of which empties directly into the river. Middlefield, situated upon the upper portion of the watershed, with a population of 650, has no public water supply or sewerage system. About three miles above the dam a small brook enters the Cuyahoga River. Some three and one-half miles above the confluence, a county infirmary with 100 inmates

is located. The sewage from this infirmary is disposed of by land filtration and does not enter the watercourse. It will be seen that the present population on the watershed is unimportant and if sewers constructed in the future include the installation of purification works, the proposed water supply for Akron will not be endangered.

Impounding Reservoir. The site for the proposed impounding reservoir has been especially well chosen, and in its lower portion the reservoir offers ideal conditions for the storage of water. In this portion the banks of the stream are precipitous and the valley broad and flat, providing only a small percentage of shallow flowage. The upper reaches of the reservoir, however, are not so favorable, and a large percentage of shallow flowage will obtain. The average depth of the entire reservoir with a dam 20 feet in height will be about 7 feet. This low average depth is of less importance when it is considered that the river will furnish a flow through the reservoir at all times.

No extensive measurements of flow of the Cuyahoga River have been made, but it is estimated by the consulting engineer that a minimum dry weather flow of twenty million gallons per day may be expected. Gagings of the flow are now being made at Kent. The storage with a dam 20 feet in height will provide for a possible daily draft of twenty-five million gallons, while with a dam of 28 feet in height, the daily draft may reach thirty-five million gallons. It will therefore be noted that a future population of 350,000 is provided for.

Purification Works. It is proposed to convey the water from the dam through a 60-inch concrete gravity conduit to the low lift pumps at the filtration plant. The flow through the conduit will be controlled by a gate house located at the dam. Detailed designs for the purification works have not been prepared but the general plans provide for coagulating basins, rapid filters, and a clear water well; the chemical treatment to comprise coagulation and sterilization before filtering. The filtration plant will be designed for a capacity of 15,000,000 gallons per day, and there is opportunity for a fifty per cent. increase of the daily capacity.

The high lift pumping station will be placed adjacent to the filtration plant, and the purified water will be pumped by duplicate units of 15,000,000 gallons capacity through a 36-inch force main to a distributing reservoir. The distributing reservoir will be constructed of concrete and will be provided with a concrete roof supported upon columns. An earth fill will cover the entire reservoir. The reservoir will have a capacity of 20,000,000 gallons.

SUMMARY.

A study of the data reviewed in the foregoing report, indicates that the city of Akron is at present provided with a water supply of very poor quality and of insufficient quantity for the growing needs of the

city. After an extensive study of available sources of water supply, the consulting engineers employed by the city have recommended the adoption of the Cuyahoga River as a new source of supply. It would appear that the source selected offers advantages over any other available source as regards the quantity of water available, and that its quality from a sanitary standpoint is equal to or better than other sources considered. To provide a water supply of a high degree of purity it is proposed to install a water purification plant of modern design, and to provide conduits and a distributing reservoir of such construction as to protect the supply from contamination.

ACTION OF THE BOARD.

At its meeting held March 21st, 1912, the State Board of Health considered the request of Mr. R. M. Fillmore, director of public service, of March 4th, for approval of the general plan for a proposed new water supply for the city of Akron as outlined and recommended in a report of the consulting engineers, Messrs. Frank A. Barbour and E. C. Bradbury. (August 12th, 1911.)

The general plan, which provided for the use of a supply from the Cuyahoga River drawn from an impounding reservoir some 1.5 miles above Kent, purified by mechanical filtration and supplied to the city through a distributing reservoir, was approved with the following conditions:

1st. That the entire contemplated improvements, including impounding reservoir, purification plant and distributing reservoir, be completed before the proposed new supply is placed in use; and that permission of the State Board of Health be obtained for temporary use of the supply prior to the completion of such improvements, should this be necessary or advisable;

2nd. That before contracts for the installation are awarded, detailed plans for the development of the proposed supply be submitted to and receive the approval of the State Board of Health; and,

3rd. That this approval be void unless detailed plans shall have been submitted to the State Board of Health prior to January 1st, 1913.

It was stated to the authorities that this approval was not to be considered as an interference between the city of Akron and the Akron Water Company with respect to the purchase of the property of the water company.

REPORT ON PROPOSED IMPROVEMENT IN WATER SUPPLY AND PROPOSED WATER PURIFICATION PLANT FOR ALLIANCE.

On October 5th, 1912, plans and specifications for proposed improvement in water supply and a water purification plant for Alliance were received from Mr. D. M. Armstrong, director of public service. The plans and specifications were accompanied by a report of Messrs. Chester and Fleming of Pittsburg, Pennsylvania, consulting engineers for the city, by whom the plans were prepared. On October 4th, 1912, the chief engineer visited Alliance and made a general examination of the existing water supply and of the proposed improvements. The following report was submitted:

The city of Alliance is situated in the northeasterly part of Stark County on the Mahoning River. Its population in 1900 was 15,083, and the city is at present experiencing a constant and rapid growth. The principal industry is the manufacture of structural iron and steel, there being a number of large plants located within the corporate limits. The city is provided with a public water supply of municipal ownership, well paved streets, and a complete system of sewers constructed on the separate plan. The sanitary sewage at present discharges through treatment works installed in 1896, which will soon be abandoned. A new plant has recently been completed, and will be placed in operation at an early date. This plant is located near the Mahoning River, north of the city, and a short distance below the water works dam and intake. The outfall from the plant is 2600 feet below the plant and some distance below the water works pumping station.

EXISTING WATER SUPPLY.

The present water supply was installed by a private company in 1883, before the State Board of Health had been given jurisdiction in the installation of public water supplies. The supply and equipment were purchased by the city in April, 1899, at a cost of \$198,000. Since that time it has been under municipal ownership, but no important improvements have been made by the municipality.

The water supply, installed by The Alliance Water Works Company, was taken from the Mahoning River at a point in the extreme northerly portion of the present corporation and was furnished to the consumers without purification. The intake is located a short distance above a low dam installed to divert water to a race formerly used to supply power for a mill. The water flowed by gravity through an intake into the head of the race, and thence, a distance of 1600 feet, to the pumping station. To supply storage in addition to that afforded by the dam, a shallow reservoir, with a capacity of 3,000,000 gallons, was

constructed between the race and the river below the dam, and was allowed to fill during high water and was drawn upon during low stages of the Mahoning River.

The watershed of the Mahoning River above the dam has an area of approximately 90 square miles. In its upper portion the topography is somewhat hilly, but in the lower portion near Alliance the topography is rolling. The population upon the watershed is about 6000 or 67 per square mile, of which the greater portion is rural. The only community on the watershed of any size is Sebring, which had a population of 2100 in 1910. Sewage from this village is now treated by an intermittent sand filter plant and the effluent discharged into a stream which is tributary to the Mahoning River about two miles above the dam. Within the city of Alliance the Mahoning River above the dam receives a considerable amount of storm water and surface drainage and until recently an appreciable amount of sewage. Trail Run enters the river about one-fourth mile above the dam and contributes a large portion of the drainage above referred to.

The available quantity of the supply obtained from the Mahoning River is subject to variation, depending upon the rainfall and run-off of the watershed. No extreme shortages of water have occurred, but each summer during recent years the flow of the stream has been almost entirely, and at times completely, utilized to furnish the supply to the city. Inasmuch as storage must be provided to furnish a sufficient supply during drought, this feature is incorporated in the plans for improvement of the supply.

The quality of the water supply need not be commented upon at length. The pollution which reaches the stream above Alliance is sufficiently great to endanger the quality of the water and make it unfit for use without treatment. Typhoid fever statistics are available for each year since 1899 and are valuable in indicating the effect of the general use of the water supply. The highest rates occurred during 1900 and 1901, when the death rates were 109 and 120, respectively. The average for the period from 1899 to 1909 was 60 per hundred thousand population.

Realizing the insufficiency of the water supply and its poor quality, the city in 1904 began a search for a new water supply. The first attention was turned to drilled wells, and a number of test wells were installed in various locations near and within the city. Application for approval of the wells near the present water works station was made in 1904, and in October of that year the Board approved of the proposed additional supply, providing the effluent of the sewage treatment works be carried to a point below the Gaskill Street bridge, about 500 feet below the water works pumping station. The condition was complied with and facilities were installed for pumping the wells drilled

at the approved location. All other test wells investigated were abandoned on account of the unsatisfactory quality of the water obtained.

The entire supply at present furnished is drawn from the Mahoning River, the wells being kept for emergency purposes. The water supply is generally used throughout the city by at least 80 per cent of the population, and the average daily consumption is approximately 3,600,000 gallons. The maximum consumption exceeds 4,000,000 gallons per day. Over one-half of the water pumped is used for manufacturing and general commercial purposes, and the total consumption represents a per capita pumpage of 240 gallons per day.

PROPOSED IMPROVEMENT OF WATER SUPPLY AND PROPOSED WATER PURIFICATION PLANT.

The plans of the consulting engineers provide for increasing the available quantity of the water supply by constructing a storage reservoir to equalize the flow of the stream and provide for improving the quality of the water supply by the installation of a six million gallon rapid or mechanical filter plant. Other improvements will be made but these relate principally to the distribution of the supply.

PROPOSED STORAGE RESERVOIR.

In selecting a site for a reservoir nine different propositions were considered. Preliminary examinations eliminated five and four projects were studied completely. These comprise (1) the north Georgetown reservoir, providing for impounding the Mahoning River and the so-called Placentia Lake, (2) either of these two projects separately, (3) the Westville reservoir, and (4) the Upper Beech Creek reservoir. Consideration of economical storage, as well as the quantity stored, led to the adoption of the Westville reservoir.

The site of the Westville reservoir is approximately eight miles upstream from the present water works intake, and is on a small tributary of the Mahoning River, about one mile south of the village of Sebring. The total drainage area of the stream above the site of the reservoir is approximately 9.5 square miles in area, and the topography is flat in its upper portion and rolling near the reservoir. The reservoir will be formed by the construction of an earthen dam with a total length of 1125 feet and a height at the center of 35 feet. A spillway 50 feet in width will provide for the natural flow of the stream. The spillway is so constructed that the total length of its crest is 80 feet, and thus its capacity is somewhat increased. The water above the dam may be carried to the stream below through a 36-inch cast iron blow-off which is connected through a gate house, provided with a 36-inch gate valve. Water may be drawn from the reservoir also at depths of 9 and 18 feet below the surface by means of two 18-inch gate valves connecting to the blow-off.

The dam will impound a reservoir with a maximum depth of 30 feet and an average depth of about 11.75 feet. The flooded area will be 106.3 acres, and the total length of the reservoir will be 1.6 miles. Its average width will be 500 feet and the sides are for the most part parallel. The reservoir has a good depth in its main portion, but there are a number of shallow ravines leading off from the sides in which the flooded depths will be considerably less than five feet. The specifications of the consulting engineers provide that the site of the reservoir inside the flow line shall be cleared of all trees, shrubs, and bushes, but it is not considered necessary, and it is not specified, to strip the reservoir of all vegetation. It is quite important that the shallow portions in the ravines, above referred to, be completely stripped of all vegetation.

The total quantity of water which will be stored by the reservoir is approximately 350,000,000 gallons. This quantity will be available and will be utilized at times when the Mahoning River has a flow insufficient to provide the water supply for the city. At such times four million gallons or more will be fed from the reservoir daily. The natural channel of the stream will be employed to convey the water to the existing intake. It should be noted that the existing sources of pollution which affect the quality of the water above the intake will not be removed and the water supply will remain more or less polluted. Ultimately it will be necessary to extend the water works intake to a point considerably above its present location to avoid the pollution reaching it from both Alliance and Sebring.

PROPOSED WATER PURIFICATION PLANT.

The plans of the consulting engineers provide for improving the quality of the water supply by installing a purification plant of the rapid or mechanical filter type, having a capacity of six million gallons per twenty-four hours. In selecting the location of the plant several alternate sites were considered. One project included the entire abandonment of the site of the present pumping station and reconstruction at a point near the Pennsylvania Railroad above the city. This project was, however, abandoned on account of the excessive cost. The site selected for the plant is property owned by the city adjacent to the existing pumping station. The main features of the plant will include low lift pumping equipment, devices for applying the chemicals, a coagulation basin, filters and a clear well. The existing high service pumps will be maintained in their present condition as a part of the improvement.

Low Lift Pumping Equipment. For the purpose of lifting the raw water to the coagulating basin, two six million-gallon centrifugal pumps, driven by steam turbines, will be installed. These pumps will take their suction from the existing intake conduit leading from the reservoir above the present dam, some 1600 feet above the pumping station.

Devices for Application of Chemicals. To provide for the application of lime and alum as coagulants, four rectangular concrete solution tanks, each 6 by 6 by 6 feet, will be constructed in the coagulant house. Each tank will be provided with a dissolving box and mechanical agitator. To provide for hypochlorite application a single solution tank, 6 by 6 by 6 feet, is designed. The solutions will all be applied through orifice boxes and will flow by gravity into the discharge line as it leaves the low lift pumps.

Coagulation Basin. The coagulation basin is an open reinforced concrete structure, 105 feet in length, 60 feet wide, and 17 feet in depth at the walls. Its capacity is 800,000 gallons, equivalent to 3.2 hours storage when the plant is operated at a rate of 6,000,000 gallons per day. The treated water is discharged at one end of the basin through seven 10-inch risers leading from a 24-inch force main. These risers discharge 24 inches above the flow line of the basin and thus an aeration of the water is accomplished. A baffle is hung across the basin at mid-distance from the inlet to the outlet end, and extends 7 feet below the flow line. The settled water leaves the basin through seven 10-inch risers, the tops of which are 3 feet 6 inches below the flow line. These risers connect to a 24-inch line leading to the filters. A 6-inch overflow controls the elevation of the flow line. For the purpose of cleaning the basin a 12-inch drain leads from the central sump to a sewer line. The floor of the basin is generously sloped to the sump.

Filters. The filters are of the rapid or mechanical type, and consist of six units, each 18.75 feet square, with an area of 350 square feet. The total capacity of the filters, operating at a rate of 125,000,000 gallons per acre per day is 6,000,000 gallons. The filter boxes are constructed of reinforced concrete. They are 10 feet in depth and their floors form the roof of the clear water basin. Directly above the floor is a false bottom, 2 feet 2 inches deep, upon which, supported by I beams, is the filter proper. Directly over the false bottom is a continuous riveted $\frac{1}{2}$ -inch steel plate, which is drilled with $\frac{3}{8}$ -inch holes, 6 $\frac{1}{2}$ inches on centers both directions, for $\frac{3}{8}$ -inch brass strainers. Above the steel plate is a layer of 10 inches of gravel, over which is placed a 10-inch mesh brass screen tied to the false bottom support, and designed to hold the gravel in place during washing. Upon the brass screen will be placed 30 inches of filtering sand. Between the surface of the sand and the edges of the wash water troughs is a space 2 $\frac{1}{2}$ feet, while the flow line of the filters is one foot above the edges of the troughs.

The operating head of the filters will vary from 11 feet, when the clear well is full, to 14 feet 9 inches when the clear well is empty. Controllers to prevent a rate of filtration exceeding 125,000,000 gallons per acre per day will be placed on the effluent line of each filter. It is not specified that the controllers shall be provided with automatic gages. Loss of head gages are specified to indicate the necessity of cleaning. All valves

will be actuated by hydraulic pressure and operated from stands which will also support the loss of head gages. The filters will be washed by water from the clear well and pumped by a steam, motor-driven centrifugal unit of 7,000 gallons per minute capacity. This capacity is required by the fact that the filters will be washed at a rate corresponding to a vertical rise of 30 inches per minute, or 20 gallons per square foot per minute. This high rate of washing will accomplish good results inasmuch as the various accessories of the filters are designed with the high wash rate in view.

Clear Well. Immediately beneath the filter units the clear water will be stored previous to pumping. The clear well is divided into two sections by the pipe gallery, each section being 61 feet 10 inches long, 21 feet 10 inches wide, and 7 feet deep. The total capacity provided is 131,000 gallons, equivalent to 0.53 hour storage when the pumpage is at the rate of 6,000,000 gallons per day. The storage of filtered water will be augmented by two standpipes of 1,000,000 gallons capacity, each located on the distribution system.

Laboratory. To provide for analytical control of the plant, a laboratory will be located in the upper story of the building. The design of the laboratory has not been worked out in detail but it is stated that the aim will be to provide complete apparatus and to make possible the carrying on of all analytical work required by the city.

High Service Pumping Equipment. As has been stated, the existing pumps will be utilized in the new installation and the plans of the consulting engineers provide for the discontinuance to all suction lines at present used. To avoid any possible use of an emergency intake no connection will remain by which the raw water may be pumped into the mains. As an emergency supply the city has and will maintain a system of wells near the pumping station, which pumped by an air compressor will yield one million gallons per day. The discharge of these wells may be carried to the clear water basin.

SUMMARY.

From the foregoing report it will be noted that the city of Alliance is at present provided with a water supply which is defective in quantity and is of unsanitary quality. The available quantity during dry seasons will be increased by the construction of a storage reservoir of 350,000,000 gallons capacity, and it is proposed to further extend the storage by the construction of additional reservoirs if this should be necessary in the future.

The quality of the supply will be improved satisfactorily by a water purification plant, the plans for which have been properly drawn. The plant is of ample capacity to care for the needs of the city for a number of years to come, and the layout is so arranged that the plant may be

doubled in size if such should be required. With competent supervision the effluent from the plant will be of a high standard of purity.

ACTION OF THE BOARD.

At a meeting held October 23rd, 1912, plans and specifications for proposed improvement in the water supply and for a proposed water purification plant for Alliance, prepared by Messrs. Chester and Fleming of Pittsburg, consulting engineers for the city, and received from Mr. D. W. Armstrong, director of public service, on October 5th, 1912, were approved subject to the following conditions:

1st. That all vegetation be stripped to a depth of at least six inches from ravines tributary to the main portion of the Westville reservoir, in which the depth of flooding will be 3 feet or less;

2nd. That the water works intake conduit be extended upstream in such manner and at such time as shall be deemed necessary by the State Board of Health;

3rd. That the rate controllers at the individual filter units be provided with indicating gages to show the actual rate of filtration;

4th. That facilities for applying a coagulant to the settled water prior to its application to the filters, be provided when required by the State Board of Health;

5th. That the use of coagulants and sterilizing chemicals be at all times subject to the approval of the State Board of Health;

6th. That the city employ a competent analyst, experienced in water purification, to provide accurate analytical control of the operation of the plant; and,

7th. That this approval shall be void unless construction of the water purification plant shall have been commenced prior to January 1st, 1914.

REPORT ON SITE FOR PROPOSED WATER SUPPLY FOR BALTIC.

On February 12th, 1912, a communication was received from Mr. L. E. Chapin, consulting engineer, requesting an examination of sites for proposed water supply for Baltic. On March 9th, 1912, a communication was received from Mr. A. P. Hahn, village clerk of Baltic, requesting an examination of a proposed site. On February 15th and on March 21st, 1912, a representative of the engineering department visited Baltic and examined the proposed locations. The following report was submitted:

Baltic, a village with a population of about 380, is located in the extreme western part of Tuscarawas County on the west fork of Sugar Creek, a tributary of the Tuscarawas River. The stream flows in a

northerly direction through the central portion of the village. The topography of the surrounding country is rather hilly. The main portion of the village lies in the valley of the stream, and on either side the hills rise to a height of about 200 feet above the stream.

The geology of the district shows the bed rock in the hills and valleys to be covered by clay deposits of varying thickness. The underlying formations consist of shales and sandstones.

The village has no public improvements, and at the present time the water supplies are taken entirely from private wells which are principally drilled and extend into the sandstone 40 to 60 feet below the surface.

The locations that have been considered for a public water supply may be designated for convenience as Sites A, B and D. Site A is a location which was proposed by the local officials. It is situated in the southeastern portion of the village and in the center of a thickly built up district. Within a radius of 300 feet there are about fifteen dwellings, and within a radius of 500 feet there are many more. In a communication to the mayor and council, February 26th, 1912, it was pointed out that this location was entirely unsatisfactory for public water supply wells.

Site B was selected by the consulting engineer as being suitable for the location of wells. This site lies at the southerly corporation line of the village in the valley of the west fork of Sugar Creek. It is not entirely satisfactory as regards surface surroundings, there being three dwellings within a radius of 500 feet. It is also subject to inundation during high stages of the stream. In the communication to the mayor and council of February 26th, 1912, it was pointed out that this location would be objectionable on account of the likelihood of future encroachment by the built up portion of the village. In this communication it was suggested that a site farther removed from the village be secured.

Site D, which is proposed by the village, is located about 800 feet south of the southerly corporation line of the village at the edge of the valley of the west fork of Sugar Creek. The location is entirely satisfactory from a sanitary standpoint as there is but one building within 1000 feet of the site. This is a dwelling located 450 feet to the north. A small wet weather run passes through the site but carries no pollution that might affect the wells.

ACTION OF THE BOARD.

At a meeting held April 11th, 1912, the State Board of Health approved the site proposed for the location of public water supply wells for Baltic, situated 800 feet south of the southerly corporation line of the village and immediately east of Ray Street extended, subject to the following conditions:

- 1st. That the supply be derived from drilled wells obtaining their water at a depth of at least 50 feet;
- 2nd. That the quality and quantity of water available, as demonstrated by a test well, be satisfactory to the State Board of Health;
- 3rd. That an area of at least 0.5 acre be purchased for water supply purposes;
- 4th. That before contracts for the installation are awarded, plans for the development of the supply be submitted to and receive the approval of the State Board of Health; and,
- 5th. That this approval be void unless a test well shall have been drilled and plans submitted prior to August 1st, 1912.

REPORT ON PROPOSED ADDITIONAL WATER SUPPLY FOR CANAL DOVER.

On June 26th, 1912, a communication was received from Mr. John J. Jurgens, health officer, requesting an examination of a proposed additional water supply for Canal Dover. On July 2nd, 1912, one of the assistant engineers visited Canal Dover and investigated the proposed additional water supply. The following report was submitted:

Canal Dover, a city with a population of 6621 in 1910, is located in Tuscarawas County on the Tuscarawas River, at its confluence with Sugar Creek. The city lies on both sides of the river although that portion south of the river has a population of only 800. The topography within the city is flat, but the surrounding country is broken by hills which border the stream valleys. Within the valley of the river the drift deposits have a thickness of 100 feet or more and consist of sand and gravel formations. These drift deposits contain abundant quantities of water. Besides a public water supply, the city has been provided with a system of sanitary sewers which discharge into the Tuscarawas River at a single outlet. The territory lying south of the river is not sewered with the exception of a few short storm water drains.

PRESENT WATER SUPPLY.

The public water supply of Canal Dover was installed in 1895. Prior to its installation the State Board of Health examined test wells located on the south side of the Tuscarawas River about 800 feet west of the easterly corporation line of the city. In March, 1895, the Board approved of a water supply for Canal Dover to be taken from driven wells in the neighborhood of test well No. 2, which had been previously sampled. The water supply was installed soon thereafter and has undergone no change with the exception of extensions of the well and distribution system.

At the present time the water supply is derived from fifteen wells located on the site approved by the Board in 1895. The wells are situated on a tract 2.2 acres in area, located, as has been stated, on the southerly side of the river in the easterly portion of the city. Five of the wells, lying to the west of the pumping station, are 61 and 70 feet in depth; and ten of the wells, to the east of the pumping station, are 51 and 85 feet in depth. The surface conditions surrounding the present source of supply are unsatisfactory. Several dwellings are within 500 feet of the wells and two at least are not more than 100 feet distant. The dwellings are each provided with a leaching privy vault, the nearest of which is 150 feet from the wells. It will be seen that the quality of the water is subject to the danger of pollution from these sources, especially at times when the ground water level is low. The formations penetrated by the wells are not accurately known, although it has been stated that the material is sand and gravel in alternate layers. Coarse gravel is said to be encountered at a depth of 80 feet, from which water is derived under artesian pressure which causes it to rise to an elevation 10 feet below the surface of the ground. The water is evidently obtained from a source that is independent of the river.

The present consumption varies from 600,000 to 720,000 gallons per day. Recently there has been some difficulty encountered in obtaining this quantity from the existing wells, due in part to the clogging of the strainers. It is thought, however, that the shortage may be met by additional wells.

Quality of Water. Samples of the water supply of Canal Dover have been examined by the State Board of Health in 1895, 1896, 1907, and at the time of the recent investigation in July, 1912. All of the analyses show that the water supply is of very good quality and is satisfactory for general domestic purposes. The organic content is very low, and the bacterial results have been quite satisfactory. The hardness of the water is moderately high, but the iron content is not sufficient to cause complaint. With regard to the constancy of the quality of the water, it should be noted that the wells are in river drift deposits and that excessive pumping during dry periods may lower the ground water level and extend the horizon from which the wells draw their supply. As a result, there is danger that pollution may be drawn to the wells.

PROPOSED ADDITIONAL SUPPLY.

Three wells have been drilled and are proposed as an additional source of water supply. The wells are placed on the same property occupied by the present source of supply but extend to a greater depth. One of the wells has been drilled to a depth of 230 feet, and the other two to a depth of 200 feet. At a depth of 129 feet, rock was encountered and to this point an 8-inch wrought iron casing was driven.

The supply is therefore obtained from the underlying rock formations. It is proposed to connect the new wells to the existing suction main and pump from them by direct suction.

Quality of Water. At the time of the examination on July 2nd, 1912, a sample was taken from the new well to the west of the pumping station. Previous to the collection of the sample the well had been pumped continuously for a week or more, having been connected to the main suction line. It was necessary to collect a sample by submerging a bottle within the well casing after the suction had been cut off. The analysis indicates that the water is of good quality from a sanitary standpoint and contains slight evidence of organic contamination. The bacteria are somewhat high, but this may be in part accounted for by the method of collecting the sample. The mineral characteristics of the water are satisfactory, although the iron content is sufficient to impart a slight turbidity to the water. Continued pumping of the well may, however, bring about a decrease in this constituent.

ACTION OF THE BOARD.

At a meeting of the State Board of Health held August 15th, 1912, the proposed additional water supply for Canal Dover, to be obtained from wells drilled 200 feet or more in depth and located on the site of the existing supply wells was approved subject to the following conditions:

1st. That the district within 1000 feet of the wells be provided with watertight sewers discharging at a suitable point of outlet to be approved by the State Board of Health; and that after these sewers are built the city council by ordinance provide for the abandonment, cleaning, disinfecting and filling with earth or ashes of all privy vaults and cess-pools within a radius of 1000 feet of the wells; and,

2nd. That the city maintain sanitary supervision over the district within 1000 feet of the wells, to prevent the accumulation of any material which might cause a deterioration of the water supply.

The authorities were advised that the Board was of the opinion that a safer water supply than at present provided might be obtained from wells located east of the city and penetrating the same formations from which the existing wells draw their supply.

EXAMINATION OF WATER FROM CANAL DOVER.

PARTS PER MILLION.

Sample Number.	Collected.	Color.	Turbidity.	Sediment.	Odor.	Oxygen Required.	Nitrogen as			
							Albuminoid Ammonia.	Free Ammonia.	Nitrites.	Nitrates.
11493	1912. July 2....	0	6	slight	none	.62	.024	.198	0	0
11494	July 2....	6	none	none	none	0.0	.010	.082	0	0
11495	July 2....	8	none	none	none	.10	.058	.042	0	.2

Sample Number.	Chlorine.	Alkalinity.	Incrustants.	Sulphates.	Residue on Evaporation.		Iron.	Bacteria.	
					Total.	Loss on Ignition.		Number per cc.	Colon Present.
11493	13.	229.	none	.....	322	.....	1.0	500	Not in 10 cc.
11494	6.	208.	36.5	.....	328	.....	0.5	2	Not in 10 cc.
11495	6.	212.	25.	.....	323	.....	0.1	2	Not in 10 cc.

*Source of Samples.**Number.*

11493. Well No. 1. Proposed additional supply.
 11494. Existing supply. Discharge from pump, 16 wells.
 11495. Existing supply. Tap at central fire station.

REPORT ON PROPOSED ADDITIONAL WATER SUPPLY FOR CANTON.

On March 21st, 1912, a delegation from Canton consisting of Mr. Ray F. Harbert, director of public service, Mr. John T. Blake, city solicitor, Mr. Phil. H. Weber, city engineer, and Mr. Louis B. Ohliger, superintendent of water works, appeared before the Board and requested approval of the use of calcium hypochlorite for purifying that portion of the public water supply of Canton which is occasionally obtained from the west branch of Nimishillen Creek by way of the water works race. The question was referred to a committee of the Board consisting of Mr. John W. Hill, engineering committee, Mr. Josiah Hartzell, member, and Mr. W. H. Dittoe, chief engineer.

On April 9th, 1912, the committee visited Canton and made a complete examination of the existing water supply and proposed additions thereto. A proposed auxiliary well supply was examined and owing to its favorable appearance the city officials were instructed to submit plans for its development. On April 13th, 1912, a plan showing the proposed development of the so-called McDonald Avenue wells was received from the director of public service.

The committee submitted the following report:

Canton is located in Stark County between the east and west branches of Nimishillen Creek just north of their confluence. The city had a population of 50,217 in 1910 and its growth is quite flourishing as indicates by an increase of 63.7 per cent since 1900. The main built up portion of the city lies on level ground, but the surrounding country is rather hilly. Drift deposits of glacial origin cover the bed rock to a depth of 100 feet or more in practically all portions of the city, but these deposits thin rapidly to the northward and there the bed rock appears a short distance below the surface.

HISTORICAL.

The first public water supply of Canton was installed in 1870. At that time the supply was taken from Myers Lake, a small natural reservoir located a short distance northwest of the city. This supply was poorly chosen and soon proved inadequate. In 1872 it became necessary to enlarge the supply and an intake was installed to draw water from the west branch of Nimishillen Creek. This supply was adequate in quantity but of unsatisfactory quality. In 1888 or 1889 the first public supply wells were drilled. These wells were located in the valley of the west branch of Nimishillen Creek near the present pumping station. About 27 wells were drilled, but the yield was insufficient to supply the total consumption and it soon became necessary to resort to the use of water from the creek.

In 1897 an additional well supply was sought and a consulting engineer was employed to prospect the surrounding country for a suitable additional supply. It was finally decided to locate additional wells in the valley of the middle branch of Nimishillen Creek about two miles north of the city, and this location was approved by the State Board of Health, April 12th, 1897.

Subsequently this location was not developed.

In 1899 approval of an additional well supply obtained from drilled wells in the valley of the west branch of Nimishillen north of Navarre Street, was requested. This supply was approved by the Board in the following resolution adopted October 19th, 1899:

"Resolved, That the Ohio State Board of Health sanctions the use of the water derived from the well at the intersection of the Nimishillen creek and Navarre street as an addition to the public water supply of Canton, Ohio."

At this time it was pointed out by the Board that the location of the so-called Navarre Street wells was somewhat unsatisfactory owing to the proximity of a densely populated district, and it was advised that further search be made for a more suitable location.

The Navarre Street wells were developed and placed in service in 1904.

Previous to the development of the Navarre Street wells the city proposed the use of wells on the so-called Union Dam property located in the valley of the west branch of Nimishillen Creek between Cedar Street and the Pennsylvania Railroad, the northerly limits being a short distance below the present pumping station and the southerly limits just north of the Navarre Street wells. The Board voted to approve this supply, and notice was sent to the superintendent of water works, Mr. Louis B. Ohliger, May 8th, 1902.

After the installation of this supply the emergency intake into the water works race was maintained to supply water during periods of excessive pumping.

From the foregoing historical description it will be noted that the city of Canton has never proceeded in a logical manner to secure a permanently adequate water supply of satisfactory quality. The developments have been necessitated by the increasing consumption and the popular complaint against the use of the race water, and have not been made with an idea of permanent solution of the problem.

PRESENT SUPPLY.

Briefly, the present water supply is obtained from 42 wells located on the so-called Union Dam property, and 7 wells located immediately north of Navarre Street. Both of these groups are in the valley of the west branch of Nimishillen Creek. While these wells furnish the principal portion of the supply, there are also three emergency sources which include Myers Lake, the west branch of Nimishillen Creek, and a group of 33 wells located near the pumping station. Myers Lake is practically not available as an additional source, the gravity conduit being almost completely plugged by roots. The wells and the creek are, however, frequently used. It is the custom to pump the wells almost constantly, discharging the water into the tail end of the water works race and thus displacing the creek water which enters the race at the upper end. By this means the race is employed to some extent as a storage reservoir and is drawn upon when necessary.

The wells on the Union Dam property and the Navarre Street wells obtain their supply at a depth of 100 to 127 feet. The water is under artesian pressure and when not being pumped flows at the surface. In drilling, the wells did not penetrate any rock formation and are entirely within the drift deposits of the valley. The total available yield of the 49 wells was estimated in 1907 to be 12,000,000 gallons per day. At the

present time with the pumping equipment used it is impossible to draw water from the wells at a rate exceeding about 9,000,000 gallons per day. During periods of excessive pumping, therefore, (which may reach 15,000,000 gallons per day), it is necessary to employ the emergency sources.

The consumption of water at Canton has increased with the population of the city during recent years. In 1906 the average daily consumption was 5,300,000 gallons, and during 1911 the average daily consumption had increased to 6,500,000 gallons. The maximum monthly average was in excess of 7,000,000 gallons, and it is quite likely that the maximum daily consumption exceeded 10,000,000 gallons. It is apparent, therefore, that the present well supply is entirely inadequate.

The quality of water obtained from the wells is good from a sanitary standpoint and numerous analyses by the State Board of Health have shown no influence of pollution.

PROPOSED ADDITIONAL SUPPLY.

Realizing the inadequacy of the present supply and the necessity of using raw water from Nimishillen Creek at frequent intervals, the local officials desire to use a disinfectant to purify that portion of the supply. The water which is drawn from the race as occasion demands is a mixture of water from the old wells at the pumping station and from the west branch of Nimishillen Creek. Above the head gates of the race the creek has a watershed area of 52.4 square miles. The population of the watershed is approximately 4,000 and includes the villages of New Berlin, Greentown, and Altman. No patrol of the watershed is maintained. The race itself is entirely unprotected from pollution and the water is subject to deterioration common to all waters stored in this unsatisfactory manner. The use of a chemical such as bleaching powder might insure safety of the supply but should not be permitted as a permanent method of purifying the water. The chemical should be used only as a temporary expedient.

The plan for development of an additional well supply contemplates the installation of several drilled wells in the valley of the east branch of Nimishillen Creek in the northeasterly portion of the city. Test wells have been drilled at the site and have appeared satisfactory. Briefly, it is proposed to drill four or more wells, connecting them to a common suction line, and to construct an auxiliary pumping station with a main leading to a standpipe and distribution system.

The property proposed for development is situated between the Wheeling & Lake Erie Railroad and the creek north of McDonald Avenue, on rather low land which is at the present time unoccupied by buildings. There are no houses within 500 feet of the proposed location and but few buildings within 1000 feet. North of the wells the valley is free from buildings, and owing to its topography it is not prob-

able that future building will be actively carried on. Two test wells have been drilled on the site, one extending to a depth of 343 feet and the other one to a depth of 335 feet. The wells penetrate the following formations:

WELL NO. 1.

(Cased to depth of 35 feet.)

<i>Material.</i>	<i>Thickness.</i>	<i>Depth.</i>
Surface soil	4 feet	4 feet
Sand and gravel.....	28	32
Sandrock	58	90
Dark shale	55	145
Sandrock	25	170
Light shale	12	182
Sandrock	81	263
Dark shale	7	270
Sandrock	73	343
Total depth		343 feet

WELL NO. 2.

(Cased to depth of 31 feet 4 inches.)

<i>Material.</i>	<i>Thickness.</i>	<i>Depth.</i>
Surface soil	31 feet	31 feet
Sandrock	89	120
Dark colored shale.....	24	145
Light colored shale.....	10	155
Sandrock	105	260
Big Injun or conglomerate sandrock.....	36	296
Coarse sand	9	305
(Not given)	24	329
Coarse sand	6	335
Total depth		335 feet

The water is obtained from the rock formations and rises under artesian pressure. It flows from the top of the casing of one of the wells with a head of 16 inches.

No adequate tests of the available yield of the wells have been carried on, but it is estimated by the local officials that a yield of 2,000,000 gallons per day may be anticipated. It would be advisable to carry on an extensive pumping test in order to obtain indications as to the available yield.

Quality of Water. Samples from the so-called McDonald Avenue well (test well No. 2) have been taken at various times to learn the quality of the water. The results of the analyses of these samples are appended. The analyses indicate that the water is of exceptional quality from a sanitary standpoint and in none of the results are influences of pollution apparent. The bacterial results of samples Nos. 11222 and 11223 were considered doubtful, but a check sample, No. 11287, also

indicated an extremely low count. In its mineral characteristics the water is also satisfactory as it contains a moderate amount of total hardness, most of which will be removed in boiling, and a low iron content.

Owing to the depth of the wells it is quite likely that the good quality of the water will be maintained without deterioration from polluting influences.

ACTION OF BOARD.

At a meeting held May 9th, 1912, the State Board of Health voted to hold in abeyance its approval of the use of calcium hypochlorite to treat that portion of the water supply of Canton obtained from the west branch of Nimishillen Creek via the water works race, but to permit its temporary use at times when the race water is used in emergency, until October 1st, 1912, pending the installation of an additional well supply.

At this meeting the Board also considered the proposed additional water supply for Canton to be obtained from drilled wells some 335 feet deep, located north of McDonald Avenue between the Wheeling and Lake Erie Railroad and the middle branch of Nimishillen Creek, as shown on a plan received April 13th, 1912, and this proposed additional water supply was approved subject to the following conditions:

1st. That no well be located within 500 feet of any cesspool, privy vault, or other source of pollution, and that the council pass an ordinance preventing the future establishment of any such polluting influence within 500 feet of any well; said ordinance to be approved by the Secretary of the State Board of Health before its passage; and,

2nd. That the proposed additional supply be installed and placed in use prior to October 1st, 1912.

The Board advised the authorities:

(1) That the installation of the additional water supply approved above could not be considered as a permanent solution of the problem of the future water supply of the city;

(2) That a thorough and extensive study of the water supply of Canton should be made by a competent engineer with the view of securing for the city a permanently adequate supply of satisfactory quality, said study to include examinations of all available sources of supply whether ground water or surface supplies; and,

(3) That the Board would expect that the results of such study, with a definite plan of procedure adopted by the city, be submitted to the State Board of Health for approval prior to May 1st, 1913.

EXAMINATION OF WATER FROM CANTON.

PARTS PER MILLION.

Sample Number.	Collected.	Color.	Turbidity.	Sediment.	Odor.	Oxygen Required.	Nitrogen as			
							Albuminoid Ammonia.	Free Ammonia.	Nitrites.	Nitrates.
11151	1912. Feb. 9...	7	none	none	none	0.0	.006	.048	0	0
11222	Mar. 20...	0	none	none	none	0.0	.012	.082	0	0
11223	Mar. 20...	0	none	none	none	0.0	.038	.082	0	0
11287	Apr. 4...									

Sample Number.	Chlorine.	Alkalinity.	Incrustants.	Sulphates.	Residue on Evaporation.			Bacteria.	
					Total.	Loss on Ignition.	Iron.	Number per cc.	Colon Present.
11151	3.	192.	15.	.....	207	20	.2	3	Not in 10 cc.
11222	4.	202.	15.	.....	250	25	.2	0	Not in 10 cc.
11223	4.	200.	15.	.....	244	30	.2	0	Not in 10 cc.
11287	.....							5	Not in 10 cc.

*Source of Samples.**Number.*

11151. McDonald Ave. test well No. 2. Well 335 ft. deep. 800 ft. from nearest dwelling.
 11222. McDonald Ave. well.
 11223. McDonald Ave wells (duplicate sample).
 11287. McDonald Ave. wells; bacterial sample only.

REPORT ON PROPOSED ADDITIONAL WATER SUPPLY FOR CHAGRIN FALLS, AND ITS DEVELOPMENT.

On April 29th, 1912, a communication was received from Mr. H. B. Pugsley, village clerk, requesting approval of a proposed additional water supply for Chagrin Falls. The request was accompanied by a plan showing the land for the proposed development. On May 1, 1912, the principal assistant engineer visited Chagrin Falls and investigated the proposed additional supply. The following report was submitted:

Chagrin Falls, a village with a population of about 2,000, is located in the extreme western portion of Cuyahoga County on the Chagrin River. The topography of the village is rather hilly, especially in its western portion. The geological formations of the locality consist of the Berea grit and Cuyahoga shale, which are covered with drift deposits having a thickness of 4 feet. In isolated spots the conglomerate formations cover the Cuyahoga shale. The village is well supplied with municipal improvements, having a water supply, a system of sanitary sewers, a sewage purification plant, and several paved streets.

Present Water Supply. The present water supply was installed in 1897, and the State Board of Health approved this public water supply for the village of Chagrin Falls, Ohio, to be obtained from twenty or more springs located about one and one-half miles from the village, the water to be pumped to a storage reservoir and delivered by gravity, with an estimated capacity of the springs of about 244,000 gallons per day.

The supply is obtained from 17 springs located in the hills bordering the valley of Haskins Creek, about one and three-fourths miles southeast of the village. The springs are within a radius of one-half mile of the pumping station near which is located a collecting well of 140,000 gallons capacity. The springs are protected by vitrified sewer pipe set vertically and the flow is conducted to the collecting well through vitrified sewer pipe conduits. The water is pumped from the collecting well into the distribution system through a storage and pressure reservoir of 200,000 gallons capacity situated near the easterly limits of the village.

The water supply is in general use and is available to practically the entire population. The average daily consumption is 140,000 gallons, and the ultimate capacity of the existing springs is estimated to be 165,000 gallons. During periods of excessive consumption, therefore, a shortage of the supply is experienced.

The quality of the present supply as demonstrated by analyses made by the State Board of Health at various times is satisfactory from a sanitary standpoint.

Proposed Additional Supply. In order to extend the available supply, the village proposes to purchase a tract of land adjoining the present water works property to the south. This tract comprises about 24 acres and is known as the Lydia B. Milks property. The land is well situated as regards the proximity of built-up districts, and springs properly developed on this tract should produce the same character of water as is obtained from the existing supply. No spring development has been made as yet, nor have definite plans been drawn.

A small stream, known as Spring Brook, flows in a westerly direction through the center of the property and discharges into Haskins Creek which forms its westerly boundary. The brook has a watershed area of about 2.5 square miles and its flow is largely supplied by springs. It

should be noted, however, that the additional supply should be obtained entirely from springs and not by impounding the water of Spring Brook.

The quality of the proposed additional supply has not been demonstrated by analytical examination. With proper development of the springs, however, it appears quite likely that a water of satisfactory quality will be obtained.

ACTION OF THE BOARD.

At its meeting held May 9th, 1912, the State Board of Health approved the proposed additional water supply for Chagrin Falls to be obtained from springs located on the so-called Lydia B. Milks property, situated immediately south of the present water works property, as described in a communication received from Mr. H. B. Pugsley, village clerk, on April 29th, 1912, subject to the following conditions:

1st. That before development of the proposed additional supply, plans showing the location of the springs, the method of protecting the springs, and means of conveying the water to the collecting well, be submitted to and receive the approval of the State Board of Health; and,

2nd. That this approval be void unless said plans shall have been submitted to the State Board of Health prior to September 1st, 1912.

On September 12th, 1912, a general plan showing the location of the springs and the method of conveying the water to the collecting well was received from Mr. E. G. Bradley, village clerk. After examination of this plan the village clerk was advised that it was inadequate in detail to show the method of protecting the springs against pollution.

On November 13th, 1912, detailed plans and specifications showing the location of the springs, the method of protecting the springs, and the means of conveying the water to the collecting well were submitted by The Wm. H. Evers Engineering Company of Cleveland, engineers for the village. After an examination of the plans the following report was submitted:

The proposed additional supply, approved by the Board in May, 1912, is to be obtained from five springs on the Lydia B. Milks property immediately south of the pumping station. Two of these springs, Nos. 1 and 4, are in the valley of Spring Brook, a small stream, while three of the springs, Nos. 2, 3, and 5, are in the sides of the hills bordering the valley.

Proposed Development of Additional Supply. The detailed plans and specifications of the engineers provide that springs Nos. 1 and 4 shall be protected against surface pollution by constructing watertight cisterns around them. It is specified that an excavation three feet in diameter and two feet deep shall be made in which shall be placed a two-foot length of 24-inch vitrified sewer pipe surrounded by concrete grouting four inches thick. The top or bell end of the pipe is to be sealed

with a wrought iron cover provided with a flanged 12-inch circular hand hole, and the bottom is to be left open for the entrance of the water from the springs.

Springs Nos. 2, 3, and 5, which flow directly from rock formations in the sides of the hills, will be protected by a semi-circular concrete curbing provided with a tight stone cover. Both the curbing and the cover will be cemented securely to the rock formation to prevent the entrance of surface water.

From all of the springs 4-inch vitrified pipe lines will convey the water to a main 6-inch vitrified pipe conduit which will carry the flow by gravity to the pump well. This gravity line will be laid with cement joints to prevent infiltration. The lower portion of the line near the pump well will be constructed of cast iron pipe and placed in fill.

ACTION OF THE BOARD.

At a meeting held November 21st, 1912, the State Board of Health approved the plans and specifications for the development of the proposed additional water supply for Chagrin Falls, submitted by The Wm. H. Evers Engineering Company of Cleveland, engineers for the village, on November 13th, 1912, (the general plans for which were conditionally approved by said Board May 9th, 1912,) subject to the following conditions:

1st. That no connection to the springs or gravity conduit line be installed whereby the water from Spring Brook may be admitted to the springs or conduit line.

2nd. That springs Nos. 1 and 4 be abandoned if at any time the State Board of Health shall find that water from Spring Brook is contaminating the supply.

REPORT ON PROPOSED ADDITIONAL WATER SUPPLY FOR DAYTON.

On December 30, 1911, preliminary plans were received from Mr. J. C. Ely, director of public service, Dayton, for a proposed additional water supply for the city. In anticipation of the submission of the plans, the acting chief engineer visited Dayton on December 21, 1911, and later one of the engineering assistants visited Dayton on January 22, 1912. The following report was submitted:

Dayton is located in the southwestern portion of the state on the Great Miami River near its confluence with the Stillwater and Mad Rivers. The population, according to the 1910 census, was 116,500. The main portion of the city is built upon flat bottom lands of the river valleys and the outskirts extend into the hillier portions beyond. The river valleys are for the most part composed of gravel and clay formations of

glacial origin and are abundantly waterbearing. The underlying rock in the vicinity is a limestone of the lower Silurian age, and the drift covering it has a thickness in the valleys of from 40 to 75 feet or more.

The city is well advanced in municipal improvements, having a satisfactory water supply; a very complete system of sewers, to which about 90 per cent. of the population is accessible; and efficient collection and removal of wastes.

INSTALLATION OF SUPPLY AND ACTIONS OF THE BOARD.

The public water supply was installed by the city in 1869. At this time the water was drawn from the Mad River and used without purification. In 1887 the use of the Mad River supply was abandoned and the first drilled wells of the present system were installed. In 1900 the State Board of Health was first called upon to pass upon the supply, being asked to give approval for the use of additional wells in the same general location as the first wells. Approval of this additional supply was granted and notice thereof was sent to the water works trustees April 19th, 1900. During the following years the well system was extended by additional wells installed at various times.

In 1909, on account of periodic shortages of the water supply, the city proposed the use of a temporary additional supply in the valley of the Great Miami River and within the built-up portion of the city. In compliance with a request from the board of public service of May 6th, 1909, the State Board of Health at a meeting held in Toledo on June 17th, 1909, approved said temporary additional water supply, provided:

"1st. That, inasmuch as the proposed additional supply is of temporary character, this approval be considered void after July 1st, 1910, and that the proposed additional supply be permanently abandoned on that date unless reapproved by the State Board of Health.

"2nd. That the proposed additional supply be used only in case the existing supply fails to yield a sufficient quantity of water for all the needs of the city.

"3rd. That the city authorities take active steps to secure as soon as possible a permanent additional supply capable of meeting all demands, and to this end it is recommended that the plans of Mr. George H. Benzenberg be adopted."

The temporary additional supply thus approved has never been developed.

PRESENT WATER SUPPLY.

The present supply is derived from about 100 driven wells located in the valley and in the bed of the Mad River in the north-eastern part of the city. The wells extend along the stream about 4,000 feet, the most westerly wells being 450 feet west of Keowee Street, and the most easterly wells immediately west of the aqueduct of the Miami and Erie Canal. Not much reliable data is available regarding the exact depth of the wells and the formations penetrated, but from available information it may be stated that they vary from about 30 to 75 feet in depth and penetrate

successive sand, gravel, and clay formations. The most easterly of the wells are favorably located as regards the possibility of pollution, but the wells farthest downstream are subject to contamination by the encroachment of the built-up portion of the city. Analyses of samples from these wells have indicated the danger of this contamination.

All of the present wells, excepting the six wells farthest east, are connected to one common suction pipe, 66 inches in diameter, which was installed in 1900; but the separate connections to this suction pipe permit the cutting off of any individual well. The six most easterly wells are pumped by a centrifugal pump discharging into an old suction main. The estimated capacity of the present system under normal conditions is 10,000,000 to 12,000,000 gallons per day. The rate of pumping varies from about 5,000,000 gallons per day to as high as 15,000,000 gallons. The maximum pumping takes place in the summer time, when the available yield of the supply is at its minimum. The necessity of an additional supply is, therefore, apparent.

The quality of the present water supply is shown by analyses which have been made in the laboratory of the State Board of Health at various times. In May, 1907, a sample representing composite of all of the supply wells showed the water to be of excellent quality from a sanitary standpoint. In August, 1907, samples were collected from individual wells Nos. 7, 23, 47, and 81 for the purpose of determining the influence of nearby sources of contamination by the water obtained from the wells. It was found by the analyses that certain of the wells showed marked evidences of contamination from nearby privies and other sources of pollution. In general it was indicated that the most easterly wells produce the best water from a sanitary point of view. Samples of the present supply were also collected in January, 1912. The analyses of these samples indicated an increase in the effect of the polluting influence as shown by the high content of nitrates. Also the samples showed the presence of colon bacillus in 10 cubic centimeter portions, although the bacterial count was low.

In general it appears that the quality of the present supply wells, especially that of the most westerly wells, is deteriorating on account of the encroachment of dwellings and other sources of pollution.

PROPOSED ADDITIONAL SUPPLY.

In adding to the present supply it has been the intention to secure an additional supply which will add a capacity of about 10,000,000 gallons per day. In April, 1909, a report on an additional water supply for Dayton was submitted to the board of public service by Mr. George H. Benzenberg, consulting engineer. In his study of available sources the engineer considered a number of alternate propositions. These consisted in a study of the Miami, Stillwater, and Mad River valleys for locations

of driven wells; the use of water from the hydraulic canal to be purified by mechanical filtration; and the employment of an area of land owned by the Bimm Dayton Ice & Cold Water Supply Company for natural filtration of the water from the hydraulic canal to add to the ground water supply near the existing wells. In his report the engineer recommended that the additional supply be obtained from a system of driven wells located in the valley of Mad River about two miles above the present pumping station and some three and one-half miles from the center of the city.

Acting upon the recommendations of the consulting engineer, the city has taken steps to install an additional supply as outlined, and without securing the formal approval of the State Board of Health, has purchased a site for the wells.

Site. The tract of ground purchased by the city has an area of 66.3 acres, and is situated in the valley of Mad River, south of the stream between the river and the Springfield Pike. The tract lies immediately west of a dam in the river which deflects the flow into an hydraulic canal, and extends some 3,000 feet west therefrom. As has been stated, the site is about two miles east of the present pumping station on Keowee Street, and is one and one-half miles east of the most easterly of the present system of wells. It lies about one-half mile east of the easterly corporation line of the city.

The site at present has several buildings upon it which, however, will be removed entirely. Immediately adjacent to the site on Springfield Pike is a residence which will be allowed to remain, and about one mile east of the site Harshman, a small community, is located. It should be noted that the future development of this community and its linking with the city by the building up of the intervening territory may contribute pollution to the proposed wells, unless proper disposal of wastes is provided.

The valley of the Mad River at the point of the proposed site has a width of about two miles; the site being located along the southerly boundary of the valley. A short distance to the east the valley widens considerably, but about two and one-half miles to the east it contracts to a throat about one-half mile in width. Above this throat it widens out rapidly to two miles or more, and this width is continuous as far as Springfield. The drift deposits within the valley consist in general of sand, gravel and clay in successive or mixed layers. The depth of the deposits, varying from 40 to 75 feet at Dayton, gradually decreases in an easterly direction. The deposits are abundantly waterbearing and at all points water is encountered at a depth of but a few feet below the surface and generally at about the level of the river.

Wells. For the present installation it is proposed to install about 40 wells, but the plans contemplate an ultimate installation of 100 or more. The wells are 8 inches in diameter and will have an average depth

of 60 feet, and on the plans are arranged at distances of 50 to 100 feet on centers. The water will be pumped from the wells through a common suction main laid below the low ground water line. This main will be 16 inches in diameter at its upper end and 42 inches at its lower end, and will terminate at centrifugal pumps by which water will be drawn from the wells and discharged into a collecting reservoir.

Collecting Reservoir and Conduit. The water pumped from the proposed wells will be discharged into a concrete covered collecting reservoir of 5,000,000 gallons capacity. The reservoir will be built partly in excavation and will be covered by an earth fill. The details of the construction of the reservoir have not been decided upon definitely. It will, however, be rectangular in plan and will be divided into two compartments by a central longitudinal wall. The elevation of the reservoir is such that the water will flow by gravity to the Keowee Street pumping station. A 36-inch cast iron conduit will leave the reservoir at the bottom and will terminate at a standpipe 20 feet in diameter by 40 feet high, located near the pumping station and designed to equalize pressure on the conduit. From the bottom of this standpipe a 40-inch suction line will lead to the pumps.

The construction of the collecting reservoir and conduit is to be made as nearly watertight as possible to avoid loss of the supply by leakage. For purposes of cleaning the conduit, should such become necessary, blow-offs are provided at various points by which the sediment may be flushed into the river.

Quality of Proposed Additional Supply. No samples from wells on the proposed site have been analyzed in the laboratory of the State Board of Health. On January 22, 1912, a representative of the engineering department collected samples from the existing supply wells and these included a sample from the most easterly group of six wells located immediately west of the aqueduct of the Miami and Erie Canal and some one and one-half miles west of the proposed site. These wells are favorably located as regards polluting influences and the analysis of a sample from them may be taken as indicative of the quality of the proposed additional supply. The analysis of the sample collected on January 22nd from this group of six wells indicates that the water is of good quality from a sanitary standpoint, and it may safely be concluded that water pumped from wells on the proposed location is of equally good quality.

Quantity of Proposed Additional Supply. The available quantity of water which may be derived from driven wells on the proposed location has been given some study by various consulting engineers employed by the city. The reports of these engineers, however, contain no data of extensive investigations relative to the volume and direction of the ground water flow, which would form a basis of an estimate of the available yield. However, the engineers employed have recommended the supply with the assumption that the available yield is sufficient. Mr.

Arthur Geisler, consulting engineer, in a report for Dayton dated August, 1908, concludes that "The recent search for more water appears to have produced sufficient evidence that both the Great Miami and the Mad River valleys, are available for, and endowed with, requisite qualities to render the desired greater water supply." Mr. George H. Benzenberg in his report of April, 1909, states that "the conditions favorable to obtaining a large supply of water from the great gravel beds exist to a greater extent in the Mad River Valley than anywhere else in the vicinity of Dayton."

The Mad River watershed above Dayton has an area of 640 square miles and the stream has a total length of 58 miles, and a total fall from its headwaters of 470 feet. It will be seen, therefore, that the gradient is rather slight. The valley in its entire length is filled with gravel deposits which serve to store large volumes of water, and the flow of the stream during dry weather is augmented by this means. The underflow of the valley is probably the source of the present, as well as of the proposed supply. In order to ascertain the available yield of a proposed extension of the supply by driven wells, it is necessary to have some knowledge of the volume of the underflow of the valley. As has been stated, no accurate knowledge of this underflow has been obtained by experiments.

The present wells contributing the entire supply furnish a maximum of about 12,000,000 gallons per day, which is insufficient in certain seasons of the year when the water consumption is high. Theoretical calculations by the water department of Dayton indicate that in 1935, the daily average consumption will approximate 25,000,000 gallons. It is important, therefore, that some assurance be had that this amount of water will be available from the Mad River valley, a fact which has not been demonstrated.

SUMMARY AND CONCLUSIONS.

From the foregoing report it will be noted that the city of Dayton is at present provided with a water supply derived from one hundred driven wells in the valley of the Mad River, and that this supply is inadequate. It should be noted also that the quality of this supply is deteriorating, especially as regards the most westerly wells which are least favorably located as regards pollution. It is the intention to supplement the supply by the addition of forty or more wells, located about two miles east of the present pumping station in the valley of the Mad River. Without securing the approval of the State Board of Health the city has purchased land for the location of the wells. The quality of the proposed supply, as demonstrated by analysis of water from the most easterly of the present supply wells, is satisfactory from a sanitary standpoint and, with proper protection of the wells, should remain so. The available quantity of the proposed supply, assumed to be adequate by en-

gineers employed by the city, is open to question and considering the magnitude of the proposed improvement a thorough study of the available yield of the Mad River valley is warranted and advisable.

Inasmuch as the quality of the water from a sanitary standpoint is satisfactory, it appears that approval be given to the proposed supply in this regard. However, some recognition should be given to the fact that the available yield of the Mad River valley has not been shown to be adequate to furnish a permanent supply for the city.

ACTION OF THE BOARD.

At a meeting held February 15th, 1912, the State Board of Health considered the proposed additional water supply for Dayton, as shown on plans submitted by the director of public service on December 30th, 1911, and approved the same as regards its quality with the following condition, namely, that the city authorities permanently control, by purchase or otherwise, all territory within 1,000 feet of any of the proposed supply wells, and cause to be removed, and prevent the future establishment of, sources of contamination within this distance; and that a certified copy of an ordinance by the city council providing for such purchase or control be filed with the Secretary of the State Board of Health before any of the proposed wells are placed in use, said ordinance to be approved by the State Board of Health before its passage.

The director of public service was advised that insufficient data on the available yield of the gravel deposits of the Mad River Valley had been submitted and in the absence of such data the danger of inadequacy of the supply within twenty-five years was anticipated; and that the Board therefore recommended that suitable tests be made of the rate of flow of ground water at different depths and that a full and complete statement of the results of these tests and other data obtainable be furnished the State Board of Health.

The Board also urged that an expert be employed to study the general problem of water supply improvement with a view to obtaining a comprehensive knowledge of the possibilities of various methods of development, including the use of a purified surface supply as well as that of a ground water supply.

ACTION OF THE BOARD.

At a meeting of the State Board of Health, held May 9th, 1912, the Secretary was directed to request the director of public service to furnish a statement as to what steps had been taken in the proposed improvement and enlargement of the public water supply; and to state that the Board would expect to receive this statement, accompanied by such data as he had secured, in time for consideration at its next meeting to be held June 19th, 1912.

Under date of June 18th, 1912, the director of public service of Dayton, notified the Secretary of the State Board of Health that nothing had been done to follow the advice and approval of the Board other than to appropriate money for the improvement.

At a meeting of the State Board of Health held June 19th, 1912, this communication was considered.

The Board did not consider that this letter was in any manner an answer to its request for a statement as to what steps had been taken in the proposed improvement and enlargement of the public water supply, and the Secretary was instructed to notify the director of public service that the Board desired definite information on the probable dry weather yield of the source of supply embraced in the Benzenberg plans, and presumed that in the development of the plans in accordance with the letter of the Board of June 21st, 1909, all the facts upon which the anticipated yield of the water field was based would be laid before the Board when the plans were submitted for approval. He also notified the director that the information requested would be expected for presentation at the next regular meeting of the Board.

Under date of July 18th, 1912, the director of public service submitted a communication in which the conditions governing the choice of the proposed additional water supply were presented, and data regarding the probable yield of the supply. This communication was considered by the State Board of Health at a meeting held July 18th, 1912, and the Board voted to approve the proposed water supply to be derived from wells in the valley of Mad River respecting the quality only; the city of Dayton to assume all responsibility as to the quantity that could be secured; and to reaffirm the conditions of its approval of February 19th, 1912, namely "That the city authorities permanently control, by purchase or otherwise, all territory within 1,000 feet of any of the proposed wells, and cause to be removed, and prevent the future establishment of, sources of contamination within this distance; and that a certified copy of an ordinance by the city council providing for such purchase or control be filed with the Secretary of the State Board of Health before any of the proposed wells are placed in use, said ordinance to be approved by the State Board of Health before its passage."

EXAMINATION OF WATER FROM DAYTON.

PARTS PER MILLION.

Sample Number.	Collected.	Color.	Turbidity.	Sediment.	Odor.	Oxygen Required.	Nitrogen as			
							Albuminoid Ammonia.	Free Ammonia.	Nitrites.	Nitrates.
6853	1907. May 23...	none	none	none	none	1.98	.036	none	trace	.20
11129	1912. Jan. 22...	7	none	none	none	.29	.012	.006	0	4.8
11130	Jan. 22...	2	none	none	none	.39	.038	.004	0	3.
11127	Jan. 22...	6	none	none	none	.24	.022	.002	0	2.2

Sample Number.	Chlorine.	Alkalinity.	Incrustants.	Sulphates.	Residue on Evaporation.		Iron.	Bacteria.	
					Total.	Loss on Ignition.		Number per cc.	Colon Present.
6853	16.5	298	90.	.....	464	44	.1	0	Not in 50 cc.
11129	11.	270	77.5	.....	418	49	0.0	100	Pos. in 10 cc.
11130	11.	262	65.	.....	380	52	0.0	100	Pos. in 10 cc.
11127	4.5	247	52.5	.....	336	40	0.1	20	Not in 10 cc.

Source of Samples.

- Number.
 6853. Composite of public supply wells.
 11129. Composite of existing public supply wells, Nos. 1 to 94.
 11130. Composite of existing public supply wells, Nos. 1 to 100.
 11127. Composite of existing public supply wells, Nos. 95 to 100. These wells comprise a group of six wells which are the most easterly of the existing supply wells. The sample was taken to indicate the quality of water derived from the proposed wells.

REPORT OF PROPOSED ADDITIONAL WATER SUPPLY FOR GRANVILLE.

On January 10th, 1912, Mr. John M. Swartz, mayor of Granville, made a verbal request for approval of an additional water supply for the village. On January 16th, 1912, one of the engineering assistants visited Granville and examined the proposed supply. The following report was submitted;

Granville is located in the central portion of Licking County on Raccoon Creek, a tributary of the Licking River. The population in 1910 was 1,394. This population is increased by several hundred during nine months of the year by the enrollment at Denison University, which is located within the village.

The topography of the village and surrounding country is rather hilly. Drainage from the principal portion of the village takes place in a southerly direction to Raccoon Creek, and from a small portion in an easterly direction to a small tributary of that creek. The locality is underlaid by sandstone of the Waverly formation, which in the hills is covered by a thin capping of soil and drift deposits, and in the valleys by gravel deposits having a thickness of from 40 to 60 feet.

Aside from a public water supply the village has no municipal improvements. In the absence of sewerage facilities privy vaults are in use. These are usually constructed with brick walls and are open at the bottom, being dug to a depth of from 6 to 8 feet. By this means subsoil water is seriously contaminated. Private wells are, however, used to a limited extent, and for general purposes the public water supply is almost exclusively employed.

Present Supply. The present public water supply was installed in 1884, before such installations were placed under the supervision of the State Board of Health. At this time three wells were drilled into the gravel deposits in the valley of Raccoon Creek, in the southwesterly portion of the village and at a moderate distance from the built-up portion. These wells extend to a depth of about 45 feet and obtain their water from water-bearing gravel. Later a fourth well was drilled to a depth of 60 feet, obtaining its water also from the gravel deposits. The water was originally pumped from these wells by a horizontal, compound, duplex Knowles pump of 340,000 gallons capacity, but in 1900 a McGowan, compound, duplex pump of 600,000 gallons capacity was installed. At the present time both of these pumps are in a poor state of repair. The water is pumped from the wells by direct suction and storage on the distribution system is supplied by an elevated tank of 100,000 gallons capacity, located in the northwestern part of the village.

No accurate figures of the present daily consumption are available, but estimates indicate it to be about 75,000 gallons. The quantity of water available from the four wells has greatly diminished and it has become necessary to improve or supplement the supply. The shortage of the yield of the wells is due to clogging of the strainers rather than to a lowering of the ground water level.

The quality of the present supply is indicated by analyses made in the laboratory of the State Board of Health in 1903, and in January 1912. These analyses indicate that the water supply in 1903 was safe from a sanitary standpoint and there were no indications of any contaminating influence. While analyses recently made also indicate that the water is

at present safe, nevertheless there are marked evidences of a polluting influence on the water from the wells. At the present time sufficient purification takes place by passage through the gravel to render the water safe, but it must be recognized that increased soil pollution in the future may endanger the quality of the water. The presence of this contaminating influence occurs as a result of the encroachment upon the water works property by the development of the village during the past ten years. While the wells as originally located were not in close proximity to habitations, they are at the present time almost surrounded by dwellings, accompanied by the usual privy vaults. With these points in view it will be seen that the present supply is not above suspicion.

Proposed Additional Supply. In attempting to secure an additional supply, a well has been drilled on the water works property about 40 feet north of the old wells and nearer the built-up portion of the village. This well was drilled to a depth of 400 feet and was plugged to a depth of 175 feet to secure a water from a depth of 125 feet. No records were kept during drilling, but it was stated by the local officials that below the gravel, which extends to a depth of about 60 feet, a shale sandstone was penetrated for a large proportion of the remaining depth of the well. The well is cased to a depth of 98 feet with 8-inch wrought iron casing, and the water level rises under artesian pressure to an elevation of 16 feet below the surface. No thorough pumping tests to determine available quantity have been made, but it is claimed that by pumping for eighteen hours each day the water level has remained unchanged. The quality of the supply obtained from this deep well is indicated by the analysis of a sample collected January 16, 1912. This analysis shows the water to be of excellent quality from a sanitary standpoint. It contains, however, an excessive amount of iron (2 parts per million), which imparts to it a distinct turbidity, and which is sufficient to cause complaint from discoloration.

SUMMARY.

From the foregoing report it will be seen that the village of Granville at present has a water supply obtained from the gravel deposits of Raccoon Creek, in the southwestern portion of the village and in close proximity to the built-up portion. The water from these wells, while originally of excellent quality, now shows evidences of remote contamination and for this reason the supply should be abandoned.

In attempting to supplement the supply a well has been drilled on the same location, obtaining its water from a greater depth, presumably from the Waverly sandstone or underlying formations. The water, while of excellent sanitary quality, is objectionable from the standpoint of its iron content, which will require a process for its removal.

The present pumping station equipment is in a rather poor condition and the installation of new equipment or extensive repairs are warranted.

It, therefore, appears advisable that in securing a new water supply, the village obtain a more satisfactory location for the wells at a point beyond the influence of contamination from the village, where wells obtaining their supply from the gravel deposits at depths of 40 to 60 feet may be safely used.

ACTION OF THE BOARD.

At a meeting held February 15th, 1912, the State Board of Health considered the additional water supply proposed for the village of Granville, obtained at a depth of 125 feet from a drilled well located on the site of the present supply wells, request for approval of same having been made by Mr. John M. Swartz, mayor, on January 10th, 1912.

The Board voted to withhold its approval of this additional water supply and to advise that the village employ a competent sanitary engineer to make a study of the problem of an additional water supply with a view to securing an entire new supply.

The attention of the authorities was called to the following facts:

1st. That the present supply, installed in 1884, while originally of excellent quality, now shows evidence of remote contamination, and that this supply should be abandoned before its quality has become seriously impaired by encroachment of the built-up portion of the village.

2nd. That the water from the proposed new well, obtained at a depth of 125 feet, while of satisfactory quality from a sanitary standpoint, contains an excessive iron content which will cause complaint on the part of the consumers unless a process for its removal is provided; and,

3rd. That in view of these facts it appears advisable, in securing a new water supply, that the village obtain a more satisfactory location for wells at a point beyond the influence of contamination from the village, where water of entirely satisfactory quality may be secured.

EXAMINATION OF WATER FROM GRANVILLE.

PARTS PER MILLION.

Sample Number.	Collected.	Color.	Turbidity.	Sediment.	Odor.	Oxygen Required.	Nitrogen as			
							Albuminoid Ammonia.	Free Ammonia.	Nitrites.	Nitrates.
2711	1903 Mar. 30	10	none	none	none	0.98	0.021	0.009	trace	none
11116	1912 Jan. 16	13	none	none	sl. musty	0.10	0.028	0.028	0.0008	1.8
11119	Jan. 16	17	13	slight	sl. musty	0.39	0.026	0.818	0.0002	0
11117	Jan. 16	7	none	none	none	0.20	0.016	0.336	0.0006	1.
11118	Jan. 16	3	14	distinct	sl. musty	0.39	0.040	0.374	0.0006	1.

Sample Number.	Chlorine.	Alkalinity.	Incrustants.	Sulphates.	Residue on Evaporation.		Iron.	Bacteria.	
					Total.	Loss on Ignition.		Number per cc.	Colon Present.
2711	8.6	289	44	.....	423	.....	0.1	6	Not in 1 cc.
11116	17.	320	85	.....	500	71	0.1	7	Not in 10 cc.
11119	20.	252	0.0	.....	317	40	2.0	20	Not in 10 cc.
11117	18.	288	50	.....	415	60	0.3	17	Not in 10 cc.
11118	18.	282	45	.....	414	45	2.2	25	Not in 10 cc.

*Source of Samples.**Number.*

2711. Public supply wells.

11116. Existing supply. Four wells 40 to 60 feet deep.

11119. New well. Proposed additional supply obtaining water at 125-foot depth.

11117. Tap at J. M. Swartz residence. Mixture of existing and proposed supply.

11118. Tap at residence of Dr. A. K. Follett. Mixture of existing and proposed supply.

Samples Nos. 11116, 11119, 11117 and 11118 were collected by Mr. R. F. MacDowell.

REPORT ON ADDITIONAL WATER SUPPLY FOR GIBSONBURG.

On August 17th, 1912, a communication was addressed to Mr. D. E. Moore, mayor of Gibsonburg, stating that it had been learned that water

supply improvements at Gibsonburg were contemplated. On August 28, 1912, a reply was received from the mayor outlining the proposed improvements. On September 11, 1912, one of the assistant engineers visited Gibsonburg and made an examination of the existing water supply and the proposed improvements. The following report was submitted:

Gibsonburg, a village with a population of 1,864 in 1910, is located in Sandusky County on the watershed of the Portage River. Although the village is principally a farming community, its growth since 1890 has been quite flourishing. It is provided with a public water supply, installed in 1897, and a number of storm sewers which are used to a greater or less extent to remove domestic sewage.

Present Water Supply. The water supply of the village was installed in 1897 after the same had been approved by the State Board of Health. At this time a well some 287 feet deep was drilled at a point about one-quarter of a mile south of the built-up portion of the village. The water was derived from a limestone formation, and analysis showed that its quality was good. Since 1907 this well has not been used and a second well, located about 150 feet west of well No. 1, was installed and has been used to furnish the entire supply. The abandonment of well No. 1 was necessitated by the entrance of surface drainage into the well through its leaky casing. Well No. 2 was installed without consulting the State Board of Health.

The water supply is at present generally used for drinking purposes. Few private wells are in use, and at least 75 per cent. of the inhabitants are provided with the public water supply. The daily pumpage averages 50,000 gallons.

The surroundings of the wells at the present time are not satisfactory, as the growth of the village which has taken place since the installation of the supply, has encroached upon the wells. Within 300 feet of the water works property in a northerly and westerly direction there are a number of dwellings which are accompanied by the usual outbuildings. The porosity of the limestone offers easy means of pollution of the water supply, especially if the wells are provided with leaky casings. Previous to the installation of the water supply in 1896, the village suffered a very severe typhoid fever epidemic, an investigation of which by the State Board of Health, showed that it was traceable to polluted well water. The private wells were in many cases found to be in close proximity to a privy vault and cesspool, and owing to the porosity of the rock, pollution readily found its way to the wells. It is not difficult to imagine that the public water supply might be polluted in like manner.

Proposed Additional Supply. Owing to the fact that entire dependence must be placed upon the single well which is now used, it is proposed to increase the supply by installing a third well. This well is to be located upon the waterworks property, about 250 feet west of well No. 2. This location is even closer to dwellings than is the existing well.

It is evidently not advisable to place any more wells upon the present waterworks property, and if an additional supply is necessary it should be secured at a site more favorably located as regards possible sources of pollution.

In connection with the improvement of the water supply, it is proposed to recase well No. 1 to prevent the entrance of surface drainage, and to thus increase the available yield of the supply.

SUMMARY.

From the foregoing report it will be noted that the water supply of Gibsonburg installed in 1897, with the approval of the State Board of Health, is at present unsuitably located on account of the growth of the village in a direction toward the wells. It is proposed to increase the supply by drilling an additional well upon the waterworks property, and to improve one of the existing wells by recasing it. It is obviously undesirable that additional wells should be drilled on the present site, and if an additional supply is required, it should be obtained at a more suitable location, the development of which should provide for the future draft of the entire supply from that point.

ACTION OF THE BOARD.

At a meeting held October 23rd, 1912, the proposed additional water supply for Gibsonburg, to be obtained from a drilled well located upon the existing water works property was disapproved. The Secretary was instructed to call the attention of the village officials to the following facts:

1st. That the growth of the village since the installation of the water supply has brought about an encroachment upon the wells as a result of which the quality of the supply is threatened.

2nd. That the installation of additional wells upon the water works property would increase the possible draft of water and thus render more likely the entrance of pollution.

3rd. That if an additional water supply is required it should be obtained from wells located on a more satisfactory site, and approved by the State Board of Health, which site should be developed with a view of ultimately obtaining the entire supply from that source.

REPORT ON PROPOSED NEW WATER SUPPLY FOR GLOUSTER.

On October 4th, 1912, Dr. E. S. Koons, president of the board of trustees of public affairs of Gloucester, called at the office of the Secretary and requested that an examination be made of a proposed new water supply for that village. On October 9th, 1912, one of the assistant en-

gineers visited Glouster and examined the existing water supply and the proposed new supply. At this time a formal request for approval signed by the mayor, members of council, and of the board of trustees of public affairs, was submitted. The following report was prepared:

Glouster is a village with a population in 1910 of 2,527. It is located in Athens County at the confluence of Sunday Creek with the West Branch of that stream. Sunday Creek flows in a southerly direction, forming the easterly corporation line of the village, passes in a westerly direction through the central portion of the village and joins the West Branch in the westerly portion of the village. The topography of the village and surrounding country is hilly. The geological formation comprises coal measures, encountered at a depth of 80 to 125 feet, overlaid by sandstones and shales. The drift deposits consist of clays and gravels of native origin.

EXISTING WATER SUPPLY.

In 1899 the village requested approval of the use of the water supply to be obtained from the drainage of Rend & Company's mine No. 6. After investigation the State Board of Health disapproved of the supply. At the time of the investigation of this proposed supply the village had already proceeded with the construction of a distribution system and reservoir and upon the completion of these features temporary pumps were installed and the mine water pumped for fire protection in disregard of the disapproval of the Board.

In 1900 the State Board of Health was again called upon to approve of the proposed water supply for the village to be derived from wells in the valley of the West Branch of Sunday Creek. Investigation by the engineer of the Board indicated that the water obtainable was of inadequate quantity and of somewhat unsatisfactory quality. Advice was therefore given to the local officials to investigate further regarding the availability of a satisfactory supply. It was understood that the State Board of Health would be furnished with results of such investigation. During 1901, however, without further submitting the proposition to the State Board of Health, and without making the tests recommended by the Board, the village proceeded to install a water supply obtained from a dug well from the valley of the West Branch of Sunday Creek. A pumping station was built and this supply was introduced for general purposes. It soon developed that the well was incapable of yielding a sufficient quantity of water and without consulting the State Board of Health, the village installed a so-called emergency intake leading directly from the West Branch of Sunday Creek into the well. At the present time the well also receives drainage from Rend & Company's mine No. 6, which is located about 1,000 feet distant. The drainage reaches the well through a 6-inch pipe.

It will be noted that the present source of supply is obtained from

the West Branch of Sunday Creek direct, from a dug well in the valley of the stream and from the drainage of a coal mine. The well is 30 feet in diameter and 38 feet deep. It is constructed of brick laid in cement mortar, the walls being carried 3 feet above the surface of the ground. The well is uncovered and is therefore subject to pollution. It has been observed that the water in the well contains a considerable amount of wood, leaves and other floating debris.

The existing water is entirely unsatisfactory in quality. The water of the West Branch of Sunday Creek contains considerable mine wastes, sufficient to make the water acid during low stages. It is turbid following rainfall. The water from mine No. 6 is totally unfit for public water supply purposes, as it is characteristic of coal mine wastes. The water from the well is of fairly satisfactory quality but is entirely inadequate in quantity to supply the village.

PROPOSED NEW WATER SUPPLY.

In order to obtain a water supply which may be used for all purposes, it is proposed to install a supply to be derived from drilled wells. The site selected is in the valley of Sunday Creek in the extreme northeasterly portion of the village, and it is proposed to abandon the existing supply and reconstruct a pumping station at the new site. •

Site. The location proposed for the wells, known as the property of the Allen heirs, has an area of 50 acres and lies between the Kanawha and Michigan Railroad and Sunday Creek. It is not proposed to purchase the entire area, the property rights being paid for according to the number of wells drilled. The site is well removed from habitations and from a sanitary standpoint is satisfactory. At the present time there are no dwellings within 500 feet of the site, and it is unlikely that building operations will be active in the future owing to the topographical conditions.

Test Well. A test well 80 feet deep has been drilled to determine the water supply available. This well penetrated the following formations:

Yellow clay	28 feet
Hardpan	10
Sandstone (water-bearing)	42
Total depth	80 feet

The well is cased with 8-inch well casing to the rock to exclude surface drainage. A pumping test of about 40 hours' duration indicated a yield of 34 gallons per minute or 48,000 gallons per 24 hours. At this time the well was pumped by an air compressor, which is the method of pumping proposed in the new installation.

Quality of Water. Two samples were taken from test well No. 1

on October 9th, 1912, to determine the quality of the proposed new supply. These samples were taken as duplicates, being collected within a period of five minutes' pumping. Previous to the collection of the samples the well had been pumped continuously for 24 hours, but on account of the newness of the well the turbidity had not cleared. The results of the analyses indicate that the water is of satisfactory quality from a sanitary standpoint, but the analyses are not so favorable as regards the chemical constituents. The water must be classed as a rather hard one and its relatively high chlorine content would point to the possibility of future salting of the supply. The iron content of the water is also high, and this may in part be accounted for by the turbidity of the samples at the time of their collection. Continued pumping may tend to reduce the iron.

SUMMARY.

From the foregoing report it will be noted that the village of Gloucester has installed and maintained in use a water supply without the approval of the State Board of Health. Recognizing its unsatisfactory quality, the village now desires to install a more satisfactory supply. In view of the former difficulties encountered in securing a satisfactory supply from wells, it is somewhat doubtful whether the proposed supply will be adequate in quantity. This fact should be demonstrated before the new supply is installed. The quality of the proposed supply is suitable from a sanitary standpoint, but the mineral constituents indicate that the water may be unsuitable for general use. Further investigation of this feature should be made.

ACTION OF THE BOARD.

At a meeting held October 23rd, 1912, the State Board of Health approved the new water supply for Gloucester to be obtained from drilled wells located on property of the Allen heirs in the extreme north-easterly portion of the village, between the K. & M. Railroad and Sunday Creek, subject to the following conditions:

1st. That prior to the installation of the supply exhaustive tests be made to demonstrate the available quantity and that the results be submitted to the State Board of Health;

2nd. That detailed plans for the development of the supply be prepared and submitted to the State Board of Health for approval;

3rd. That a plant for the removal of the iron content be incorporated in the design and be installed if future examinations of the State Board of Health shall demonstrate its necessity;

4th. That the village council by purchase or otherwise control all property within 500 feet of any well and prevent the establishment of any source of pollution within that distance; and

5th. That this approval shall be void unless detailed plans for the

development of the supply and the results of tests for quantity, shall have been submitted to the State Board of Health prior to April 1st, 1913.

The authorities were advised to employ an engineer experienced in water works design to superintend the tests and furnish the design for the proposed installation. They were also informed that while the quality of the proposed new supply is satisfactory from a sanitary standpoint, the mineral characteristics are objectionable.

REPORT ON PROPOSED INCREASE IN WATER SUPPLY FOR JEFFERSON.

On March 18th, 1912, a topographic map showing the location of the existing waterworks dam at Jefferson and the area included in a proposed enlargement of the impounding reservoir, was submitted by Mr. B. F. Hewit, consulting engineer for the village. On April 9th, 1912, a plan showing the details of the proposed enlargement of the dam was submitted to the consulting engineer. On April 16th one of the assistant engineers visited Jefferson and made an examination of the location of the proposed enlarged reservoir. The following report was submitted:

Jefferson, a village with a population of about 1,500, is located in Ashtabula County near Mill Creek, a tributary of the Grand River. The topography of the village and surrounding country is rather flat. Drainage from the village is in a northerly and northwesterly direction to a small branch of Mill Creek, which joins the stream about one-third mile below the present waterworks dam. The village is provided with a complete system of sanitary sewers, a sewage purification plant, and a public water supply which is purified by a mechanical filter plant.

Present Water Supply. In 1906 an attempt was made by the village to secure a water supply obtained from wells, but upon drilling and testing a number of wells they were found to furnish an inadequate quantity. Following advice of the State Board of Health, a search was made for a water supply adequate in quantity and of satisfactory quality, and in 1907 plans were submitted for the installation of a supply to be obtained by impounding the flow of Mill Creek and purifying it by a mechanical filter plant.

The State Board of Health, at a meeting held June 12th, 1907, considered the plans for a new water supply and water purification works for Jefferson, as shown on drawings and in the description submitted by Messrs. Chapin and Knowles, consulting engineers. on May 31st, 1907, and the plans were approved provided:

- 1st. That the management and operation of the plant, the use of the coagulant, and the rate of filtration be at all times satisfactory to the State Board of Health;

- 2nd. That detailed plans showing method of controlling rate of

filtration be submitted to and receive the approval of the State Board of Health before the plant is built; and.

3rd. That detailed plans of the sedimentation basin and of the coagulant apparatus be submitted to and receive the approval of the State Board of Health before the plant is built.

April 11th, 1908, Mr. L. E. Chapin, consulting engineer, submitted revised detailed plans for a water filtration plant, and at its meeting held April 22nd, 1908, the State Board of Health approved these plans, provided;

1st. That the management and operation of the plant, the use of the coagulant, and the rate of filtration be at all times satisfactory to the State Board of Health; and

2nd. That the loss of head gages be placed at the outlets of the filters when the plant is constructed.

The plant was installed during 1908 and was placed in operation in December of that year.

Briefly, the present supply includes a small impounding reservoir in Mill Creek, an intake leading to the low lift pumps, and a mechanical filter plant with a nominal capacity of 900,000 gallons. The impounding reservoir is formed by a concrete gravity dam 4 feet in height, which is located about two miles north-west of the center of Jefferson and about 1,000 feet north of the Austinburg Road. The quantity of water stored is roughly calculated to be about 2,000,000 gallons, and it will be recognized that this quantity is totally inadequate to supply the village during periods of extended drought.

July 10th, 1911, Mr. B. F. Hewit, consulting engineer, submitted a plan for increasing the water supply by constructing a dam about 900 feet below the existing dam, by means of which a storage of 13,000,000 gallons would be obtained. Owing to the proximity of a cemetery and a dwelling, the Board did not approve of this project, and at a meeting held July 19th, 1911, the Board voted to refer the matter back to the consulting engineer for further report.

Proposed Increase in Water Supply. The plans of the consulting engineer recently submitted provide for an increase in the water supply by elevating the present dam to a height of 8 feet. Anticipating the approval of the Board, construction work has already been commenced. The elevation of the dam is to be accomplished by superimposing a new concrete structure over the old dam. The plans as submitted provide for the enlargement of the section of the dam by placing concrete covering resting upon the old dam and covering both the upstream and downstream sides of the dam. It was learned by the assistant engineer, however, that in construction the plans are to be changed and the concrete facing on the upstream side of the dam is to be omitted. The upstream side of the new structure will therefore coincide with the upstream side

of the old dam. This is done presumably to facilitate construction and to permit of the omission of the cofferdam. It should be noted, however, that this method will introduce weakness in the structure.

The watershed of Mill Creek above the dam has an area of 79 square miles. It is sparsely settled and there are but two communities, Dorset, having a population of about 200, and Leon, having a population of about 100, both of which are upon the upper portion of the watershed. The watershed consists largely of farm land and pastureage.

The proposed new dam will lift the water in Mill Creek to a maximum depth of 8 feet, and this will back up the flow a distance of 4,000 feet above the dam. The area of the reservoir thus formed will be approximately 20 acres, about 80 per cent of which will have a depth of 4 feet or less. The land which will be flooded is at present to a large extent covered with timber and this will be removed by the owners before the dam is completed. There is, however, a considerable area which is sodded and used for pasture land. The sodded portion will lie principally in the shallower parts of the reservoir. It is apparent that objectionable tastes and odors will be created by the presence of organic matter as well as by the growth of organisms unless the reservoir is stripped of vegetation in its shallower portions. It would be desirable to eliminate several of the shallower portions of the reservoir by proper diking. This may be accomplished easily and at a small cost.

The land surrounding the site of the reservoir is at present used to a large extent for pasturing cattle and it is obviously necessary that some provision be made to protect the water supply from contamination from this source. A well-constructed fence should be built around the reservoir at a distance of at least 6 feet from the water's edge. At the present time the village owns the land that will be actually flooded, and in order to construct this fence it will be necessary to purchase additional area.

ACTION OF THE BOARD.

At its meeting held May 9th, 1912, the State Board of Health approved the proposed increase in the water supply for Jefferson, as shown on plans submitted by Mr. B. F. Hewit, consulting engineer, March 18th and April 9th, 1912, subject to the following conditions:

1st. That in those portions of the reservoir having a depth of less than 5 feet, the ground to be flooded shall be stripped of vegetation and soil to a depth of at least 6 inches; and,

2nd. That the reservoir be surrounded with a substantial fence placed at least 6 feet from the water's edge.

The Board also advised:

(1) That the section of the dam should be enlarged according to the original plan of the consulting engineer submitted April 9th, 1912, and that the modification of this plan omitting that portion of the new

concrete construction on the upstream side of the dam, will cause a weakness in the structure; and,

(2) That it will be economical and beneficial to the quality of the supply to remove from the area of the reservoir by diking, several arms which will be flooded to a depth of about one foot.

REPORT ON PROPOSED DEFERRIZATION PLANT AT LEIPSIC.

During the summer of 1911, a deferrization plant for the village of Leipsic was installed after plans prepared by Mr. George Champe, consulting engineer. Plans for this installation were not submitted to the Board previous to the construction, but upon request Mr. Champe submitted plans on December 20th, 1911. On January 4th, 1912, one of the engineering assistants visited Leipsic and examined the plant as constructed. The consulting engineer desires the action of the Board on the plant, and inasmuch as he may propose other plants of like description for municipalities in Ohio, it is advisable that the Board pass upon the Leipsic plant. The following report was submitted:

Leipsic is located in the northeastern corner of Putnam County and has a population of about 1,800. The water supply was installed by the village in 1901 and is derived from four drilled wells which receive their supply from a limestone formation encountered at a depth of about 80 feet from the surface. The entire supply is drawn from the limestone, as the casings of all the wells penetrate the drift deposits.

The analyses by the State Board of Health have indicated that the water supply of Leipsic, although satisfactory from a sanitary standpoint, contains an excessive iron content. The character of this iron has not been determined. The iron has been the cause of objection on account of deposits in the mains and the staining of plumbing fixtures. Hydrogen sulphide is also present in the water as it comes from the wells in such a degree as to cause odors.

The deferrization plant as installed consists of an aerating device and a settling basin. The discharge pipe from the wells extends upward at the center of the settling basin to within a few feet of the roof, where the water is discharged at a point about 10 feet above the overflow line of the basin. The aerating device is supported by this discharge pipe. The aerators consist of three horizontal, circular steel plates with diameters of 5 feet, 6 feet and 7 feet, which surround and are riveted to the pipe. The uppermost plate, which is the smallest, is placed one foot below the end of the discharge pipe; the second, or 6-foot plate, is 3 feet lower; while the largest plate is 3 feet below the second plate and 3 feet above the overflow line. The plates are perforated with $\frac{1}{4}$ -inch holes

spaced one inch on centers. In operation the water from the discharge pipe percolates through the plates successively, thus absorbing the oxygen which permits the precipitation of the iron. Sedimentation of the iron takes place in the settling basin.

The settling basin, which is of concrete construction, is 50 feet in diameter, and has a depth to the flow line of 14 feet 9 inches. Its capacity, therefore, is 217,000 gallons, which, based on an average daily consumption of 120,000 gallons, provides an average storage of forty-three hours. With sufficient aeration this storage should produce good removal of the iron, provided the character of the iron admits of precipitation by aeration. A 6-inch cast iron pipe is provided to drain the sludge from the basin. The bottom is sloped to this drain which leaves the central portion of the basin. The suction line from the basin to the pumps is located near the outer wall and extends upward through the floor. A conical screen is provided to prevent the entrance of iron deposits. This suction line should more properly enter the basin through the wall and should be provided with an inverted elbow.

The deferrization plant, as a whole, during its six months of operation, has given satisfactory results in the removal of the iron as well as of the objectionable taste and odor of hydrogen sulphide. It was noted, however, that the aerating device is coated with an incrustation of hard scale iron deposits. It is evident that the continuation of this will eventually clog the perforations of the aerating pans and the water will flow over the edge of the pans without receiving effective aeration. The device is, moreover, inaccessible for cleaning, and it does not appear possible to maintain proper operating conditions.

At the time of the inspection samples were collected to indicate the efficiency of the iron removal. It was found that the water from the three wells being pumped contained 2.5, 0.2 and 0.3 parts per million of iron, respectively. The average iron content of the water pumped was, therefore, 1.0 part per million. The effluent from the plant contained 0.3 part per million, which indicates efficient removal. The hydrogen sulphide odor was entirely eliminated by the treatment.

SUMMARY.

From the foregoing report it will be noted that the village of Leipsic, without securing the approval of the State Board of Health, has installed a deferrization plant for the improvement of its water supply. The plant has during the first six months of its operation produced a marked improvement in the quality of the water and has eliminated the objection arising from the iron and hydrogen sulphide contained in the water which is pumped from the wells. The design of the aerator, however, is open to criticism, and it appears that the device will eventually become of low efficiency owing to the clogging of the perforations which must eventually occur as a result of incrustation by the iron deposit. It is, therefore, ap-

parent that the plant cannot be considered satisfactory as a permanent means of removing the iron from the water.

ACTION OF THE BOARD.

At a meeting held February 15th, 1912, the State Board of Health considered the plans for a deferrization plant already installed at Leipsic, prepared and submitted by Mr. George Champe, consulting engineer, December 20th, 1911, and voted to withhold its approval of the plans, and to advise that an aerating device of more satisfactory design be provided to insure a permanent efficiency of aeration.

REPORT ON PROPOSED ADDITIONAL WATER SUPPLY FOR LISBON.

On May 20th, 1912, a request was received from the board of trustees of public affairs of Lisbon for approval of an additional water supply for that village. Anticipating the request for approval one of the assistant engineers visited Lisbon on May 17th, 1912, to make an investigation of the proposed additional supply. The following report was submitted:

Lisbon is a farming community with a population of about 3,000, located in the central portion of Columbiana County on the middle fork of Little Beaver River, which flows through the southerly portion of the village. The topography of the locality is hilly and the drainage is in a general south-easterly direction. The village is supplied with several municipal improvements including a few miles of sewers built on the combined plan and a public water supply municipally owned and operated. The present water supply is inadequate and additions are required to meet the demands of the village.

Present Water Supply. The public water supply of Lisbon was installed in 1848. The first supply was obtained from a small impounding reservoir in the hills above the village and was used for fire protection only. In 1887 four wells were drilled near the middle fork of Little Beaver River, but these failed and a direct connection to the stream was established. In 1903 another attempt was made to secure a ground water supply but this also was a failure. In 1904 another effort was made to obtain water from wells and the Board was asked to approve of a new source of water supply for the village.

December 3rd, 1904, the State Board of Health approved an additional or new source of water supply for Lisbon, to be obtained from wells 115 feet deep, located near the present pumping station near the bank of Beaver Creek.

The present supply is obtained from eleven drilled wells located in the valley of the middle fork of Little Beaver River in the south-easterly

portion of the village. Seven of these wells are drilled 120 feet deep, while four are 285 feet deep. They penetrate shale formations and obtain water from sandstone at a depth of 85 feet or more. The wells are pumped by air lift into a collecting reservoir of 70,000 gallons capacity, from which the service pumps take their suction. A distribution reservoir is located on a hill one-half mile east of the pumping station. It is constructed in excavation and lined with vertical walls of rough masonry. It is 50 feet square, 19 feet deep, and is uncovered.

The average daily consumption is approximately 250,000 gallons and there are about 500 connections serving 80 per cent of the population. It is locally claimed that during the past few years the river has not been drawn upon to furnish water pumped into the mains. The inadequacy of the present supply, however, will make the use of the emergency supply necessary unless an additional supply is obtained.

The failure of the wells to supply the necessary quantity of water caused the local officials in June 1911 to request approval of an additional supply to be obtained from wells located a short distance north of the existing wells. This new location was in the built up portion of the village.

At a meeting held July 19th, 1911, the State Board of Health considered the question of an additional water supply for Lisbon; and the 8-inch well, located on the grounds of the Chestnut Street School, was approved as an additional source of water supply until July 1st, 1913, provided:

1st. That no new well be located on this site without first receiving the approval of the State Board of Health:

2nd. That all abandoned gas wells within 300 feet of the well be filled with concrete, and that the State Board of Health be notified that this requirement has been fulfilled by your Board;

3rd. That all privy vaults within 300 feet of the well be made and maintained water-tight, and that council file with the State Board of Health a copy of the ordinance requiring that this be done; and,

4th. That the top of the proposed well be protected from the entrance of any surface water.

The Board urged that the question be taken up of improving the water supply on a broader basis with the idea of going outside the village, if necessary, and obtaining a suitable and permanent supply.

Following the above action of the State Board of Health, the local officials, realizing that the approved location was not all that might be desired, took steps to secure a more suitable site and have finally selected a location north of the village in the valley of Middlesite Creek which is tributary to the middle fork of Little Beaver River.

Proposed Additional Supply. The location of the proposed additional supply wells was examined by one of the engineering assistants in December 1910, and samples from a test well were collected at that time.

The site was again examined by one of the assistant engineers on May 17th, 1912, but at this time it was impossible to collect samples.

The site proposed for development is located three-fourths mile north of the center of the village and about three-fourths mile north of the present pumping station, on property adjoining the Fair Grounds and owned by the county. The land slopes gently to Middlesite Creek which flows in a southerly direction a short distance east of the site. The only habitations near the site are two dwellings located 300 feet north-east and 400 feet southeast, respectively, of the site. There are also several buildings on the Fair Grounds, approximately 300 feet west of the well.

A test well 8 inches in diameter has been drilled to a depth of 257 feet to determine the quantity and quality of the available supply. This well penetrates the following formations:

(Cased to a depth of 21 feet.)

<i>Material.</i>	<i>Thickness.</i>	<i>Depth.</i>
Drift	16 feet	16 feet
Brown sandrock	4	20
Shale	4	24
Coal	1	25
White sand	10	35
Shale	35	70
Sand	20	90
Shale	60	150
Sand	30	180
Water lowered 13 feet (crevice)		
Slate and shale.....	40	220
Sand	37	257

Total depth of well..... 257 feet

The water is obtained from various waterbearing strata below the shale formations. Subsequent to the drilling of the well, it was tested for quantity by pumping with an air lift for seven and one-half days. The average yield during this pumping test was estimated to be 216,000 gallons per twenty-four hours, and the water level was lowered 30 feet. It was also learned that during the test two dug wells located at the dwellings before referred to were drained completely. This fact would indicate not only a great lowering of the water level but a direct connection between the private wells and the test well. The decided lowering of the ground water level would also indicate the probability of failure of the supply.

It is proposed to develop the supply by installing air lift apparatus in the wells used. The air will be conducted from the pumping station (three-fourths mile south of the wells), and the water will be conveyed through a gravity cast iron conduit to the collecting reservoir at the

pumping station. It will be noted that the distances through which the air and water are to be conveyed are excessive.

Quality of Water. A sample of the water from the well was collected by one of the local officials on November 25th, 1910, following the pumping test for quantity. The results of the chemical examination of the sample indicate that the water is of good quality from a sanitary standpoint, although the small content of nitrates would indicate slight pollution. The bacterial results are unsatisfactory, but these may be due somewhat to the newness of the well. Intestinal organisms were not found, which would indicate the absence of dangerous pollution. The mineral characteristics of the water are satisfactory except for the iron content (one part per million), which, however, may be reduced somewhat by continued pumping, especially by the use of air lift followed by storage.

SUMMARY.

From the foregoing report it will be seen that although the village of Lisbon has had a public water supply for a great number of years, it has never been satisfactorily supplied with water of good quality and adequate quantity. To avoid the use of unpurified river water, several attempts have been made to obtain an adequate ground water supply but these have resulted in failures or at least in obtaining an insufficient quantity. The latest attempt contemplates the use of drilled wells at some distance from the present pumping station, and it is doubtful if a greatly increased supply will be obtained owing to the excessive length of the air mains to be used in pumping the wells. It would appear that the village should take steps to secure if possible a permanently satisfactory supply, and with this in view a competent engineer should be employed to locate and design the development of such a supply. In the meantime, however, the village will suffer a shortage of supply from the drilled wells unless they are permitted to use the additional wells on the Fair Grounds property. It would appear, therefore, that the village should be permitted to install the proposed additional supply for temporary use pending the preparation of plans for a new water supply.

ACTION OF THE BOARD.

At a meeting held June 19th, 1912, the State Board of Health approved temporarily the proposed additional water supply for Lisbon, to be obtained from drilled wells located on the "Fair Grounds" property so-called, described in a request from the board of trustees of public affairs received May 20th, 1912, subject to the following conditions:

1st. That before January 1st, 1913, the village present to the State Board of Health for approval a plan for obtaining a permanently satis-

factory water supply, the same to be formulated by a competent consulting engineer;

2nd. That the council pass an ordinance providing that all privy vaults, cesspools, and dug wells within a radius of 500 feet of any public supply well be removed or cemented and made watertight, and preventing the future establishment of such sources of pollution within that distance; said ordinance to be approved by the Secretary of the State Board of Health before its passage;* and.

3rd. That this approval be considered void unless the proposed additional supply shall have been installed prior to January 1st, 1913.

The authorities were advised that the ordinance to protect the water supply wells against pollution should provide that when privy vaults, cesspools, or dug wells are abandoned, they should be thoroughly cleaned and disinfected before being filled with clean earth or ashes.

The Board also called attention to the fact that the length of air mains from the pumping station to the wells was excessive and would render pumping costly.

EXAMINATION OF WATER FROM LISBON.

PARTS PER MILLION.

Sample Number.	Collected.	Color.	Turbidity.	Sediment.	Odor.	Oxygen Required.	Nitrogen as			
							Albuminoid Ammonia.	Free Ammonia.	Nitrites.	Nitrates.
10058	1910. Nov. 25..	6	faint trace	none	none	.10	.022	.152	0	.2

Sample Number.	Chlorine.	Alkalinity.	Incrustants.	Sulphates.	Residue on Evaporation.		Iron.	Bacteria.	
					Total.	Loss on Ignition.		Number per cc.	Colon Present.
10058	4	182	none	.....	239	19	1	2400	Neg. 10 cc.

Source of Sample.

Number.

10058. Fair Grounds drilled well.

Sample collected by David Eells, health officer.

*Submitted July 11th, and approved July 13th, 1912. Secretary.

REPORT ON PROPOSED WATER SUPPLY FOR MAGNOLIA.

On July 16th, 1912, there was received from Mr. W. L. Hime, mayor of Magnolia, a formal request for approval of a proposed location for public water supply wells. In anticipation of this request, several visits were made to Magnolia. The following report was submitted:

Magnolia, a village with a population of about 550, is located partly in Carroll County and partly in Stark County, in the valley of Big Sandy Creek. A portion of the village extends into the hills which border the stream. The topography is rolling and the hills rise to a considerable height above the level of Big Sandy Creek. The locality is covered by deposits of glacial origin, which are of considerable thickness in the stream valley but which thin out in the hills. The village is without public improvements and the present water supply is obtained entirely from private wells. These are principally drilled or driven and vary in depth from 35 to 100 feet. The deeper wells in the hills produce an iron-bearing water which is objectionable for use. The shallower wells are in the valley of the stream and obtain their water from gravel formations.

PREVIOUS INVESTIGATIONS AND ADVICE.

On November 2nd, 1911, a representative of the engineering department visited Magnolia for the purpose of examining a site proposed for the location of wells. At this time the so-called creamery site was examined and it was found to be unsatisfactory as regarded its location. Under date of November 16th, 1911, a communication was sent to the local officials and to Mr. L. E. Chapin, consulting engineer, advising against the creamery site and suggesting more suitable sites located in the valley of the stream north of the village and also to the southwest of the village. Following this communication, visits were made to Magnolia on April 10th and April 19th, 1912, by the chief engineer and one of the assistant engineers, respectively, at which times it was informally advised that the wells be located in the valley of Big Sandy Creek north of the village. On April 30th, 1912, a communication was received from Mr. John H. Rice, member of council at Magnolia, which stated that the local officials still desired, in spite of the opinion of the engineering department of the Board, to locate wells to the west of the village, and requesting that a representative of the Board inspect a new site selected in this direction. Accordingly, one of the assistant engineers visited Magnolia on May 7th, 1912. Following this visit, a communication was addressed to the local officials on May 8th, 1912, informally disapproving the new site. In spite of this, however, a well was drilled on the site and another visit was made to Magnolia on June 11th, 1912, by one of the assistant engineers for the purpose of secur-

ing samples from this well. On July 2nd, 1912, following this visit, another communication was addressed to the local officials, again advising that the proposed location was unsatisfactory from a sanitary point of view. A formal request for approval of the site was nevertheless received in spite of this advice.

PROPOSED WATER SUPPLY.

Site. The site now proposed is located just north of Carrollton Street, west of the village, and half way between Big Sandy Creek and the Sandy and Beaver Canal. The site is about 700 feet west of the creamery site, which was originally proposed for the location of wells. The nearest buildings are two farm houses about 400 feet to the southwest, while the nearest buildings in the built up portion of the village are about 500 feet to the east. The site, though more favorably located than the creamery site, may still be considered unsafe, being in the natural direction of the subsoil seepage from the village. Wells on the site would be in danger of contamination in the future.

The reasons given by the local officials for desiring not to locate wells on the Canton Road site are the extra cost due to (1) extra pipe line; (2) an extra river crossing; and (3) more expensive property. Also they are of the opinion that the quality of the water at the location would not be so good as that to be secured in the valley of the creek west of the village. Furthermore, they are very desirous of constructing a storage reservoir southwest of the village instead of a standpipe, and they fear that wells located on the Canton Road site will necessitate the latter course, due to necessary economy. It should be stated in this connection that the contract for the installation of a distribution system had already been let, at the time of the first visit, and a large proportion of the pipe laid, though the location of the wells had not been selected. There is but \$10,000 available for the construction of water works, and the local officials are hence attempting to sacrifice a proper location for the wells in order that the waterworks may be constructed within this amount.

Test Well No. 1. Test well No. 1 on the site is located about 30 feet north of the Carrollton Road and 300 feet east of Big Sandy Creek. It is 6 inches in diameter and 74 feet deep. In drilling, the following formations were penetrated:

<i>Material.</i>	<i>Thickness.</i>	<i>Depth.</i>
Fine sand (loamy).....	20 feet	20 feet
Coarse sand	40	60
Sand and gravel.....	5	65
Gravel (containing some coarse sand and waterbearing)..	9	74
Total depth		74 feet

In drilling, water was found in only small quantities above the 65-foot depth, at which depth a good vein was encountered. Before starting the pumping test, the water level stood at 5 feet from the surface. The well was pumped about seven hours on June 6th, about twelve hours on June 10th, and five hours on June 11th. The pumping was done with a Hughes duplex steam pump having a 2½-inch suction and a 2-inch discharge pipe. The well was pumped at an average rate of about 100 gallons per minute. Upon starting pumping, the water level was quickly lowered to about 10½ feet from the surface, where it remained throughout each test.

Quality of Water. The results of the chemical analysis of a sample from the well indicate that the water is of a satisfactory character from a sanitary point of view and is rather soft for well water, but that it contains considerable iron. The bacterial results, however, are not satisfactory, showing the presence of colon bacilli in 10 c. c. This latter, however, may be due to accidental contamination as the bacterial count is low. In general it may be said that little stress should be laid upon the results of the analysis.

SUMMARY.

From the foregoing, it will be seen:

1. The site proposed for the location of public supply wells at Magnolia is not satisfactory from a sanitary point of view. Wells on this site would be in danger of contamination, in the future, by subsoil drainage from the village.

2. An examination of a test well drilled on the site, indicates that the supply is of adequate quantity for the needs of the village. It is probable, however, that water in sufficient quantities can be secured at any point in the valley of Big Sandy Creek.

3. The results of the chemical analysis of a sample from the well indicate that the supply is at present of satisfactory character from a sanitary point of view. It is low in organic matter and is fairly soft, but contains considerable iron. The bacterial results, however, are unsatisfactory, containing colon bacilli in 10 c. c. This, however, may be due to accidental contamination and not much importance should be given to the result.

ACTION OF THE BOARD.

At a meeting held July 18th, 1912, the State Board of Health considered the request received from Mr. W. L. Hime, mayor, on July 16th, 1912, for approval of the site located north of Carrollton Street between Big Sandy Creek and the Sandy and Beaver Canal, for proposed public water supply wells for Magnolia. This site was disapproved. The attention of the authorities was called to the necessity of securing a water supply safeguarded by its location, and they were advised that sites in the valley of Big Sandy Creek above a point where the subsoil

drainage of the village may pass should be investigated and if found satisfactory such a site should be selected and submitted to the Board for approval.

EXAMINATION OF WATER FROM MAGNOLIA

PARTS PER MILLION.

Sample Number.	Collected.	Color.	Turbidity.	Sediment.	Odor.	Oxygen Required.	Nitrogen as			
							Albuminoid Ammonia.	Free Ammonia.	Nitrites.	Nitrates.
11447	1912. June 11...	0	13	slight	none	.34	.028	.348	.0002	0

Sample Number.	Chlorine.	Alkalinity.	Incrustants.	Sulphates.	Residue on Evaporation.		Iron.	Bacteria.	
					Total.	Loss on ignition.		Number per cc.	Colon Present.
11447	3.5	163	2.5	.....	223	12	1.1	100	Pres. in 10 cc.

Source of Sample.

Test well No. 1; 74 feet, drilled into gravel.

REPORT ON PROPOSED WATER SUPPLY FOR MALVERN.

At its meeting held September 14th, 1911, the State Board of Health approved Sites A and B for public water supply purposes for the village of Malvern, as shown on plan received on September 11th, 1911. provided that, by means of test wells, it be shown that water of sufficient quantity and of a quality satisfactory to the State Board of Health could be obtained.

On February 13th, 1912, a representative of the engineering department visited Malvern for the purpose of examining a test well on one of the proposed sites. The following report was submitted:

Malvern is a village with a population of 750, located in the north-western part of Carroll County on the Big Sandy Creek, a branch of the Tuscarawas River.

Subsequent to the approval of Sites A and B in September, 1911, it was decided by the local officials and their consulting engineer to locate the water supply wells on Site B. An option has been secured on one acre of ground on the farm of Henry Ebner, immediately north of the northerly corporation line of the village. The site is favorably located as regards the proximity of possible sources of pollution. The only building within 1000 feet of the site is a farm dwelling located about 350 feet northeast of the boundaries of the site. In order that wells located on Site B may not be subject to the danger of pollution, a privy near this farmhouse and about 400 feet from the test well should be removed and a watertight vault substituted. For the future protection of the wells, regulations should be made by the local authorities to prevent the location of possible sources of contamination within a radius of 500 feet of the wells.

The test well, which has been drilled on Site B, is 8 inches in diameter and 111 feet deep. In drilling, the following formations were penetrated:

<i>Material.</i>	<i>Thickness.</i>	<i>Depth.</i>
Sandy surface soil.....	5 feet	5 feet
Coarse sand	12	17
Quicksand	36	53
Soft blue shaley sandstone.....	12	65
Hard white sandstone.....	3	68
Soft blue shaley sandstone.....	43	111
Total depth of well.....		111 feet

The water reaching the well is derived from the soft blue shaley sandstone, which is encountered below a depth of 68 feet. The well is cased to a depth of 54 feet, which prevents the entrance of the shallower ground water. A test for quantity was made on February 5th and 6th, 1912. Before pumping, the water level was 14 feet below the surface, and this was lowered to 18 feet by a short period of pumping. Continued pumping for 16 hours at a rate of 100 to 150 gallons per minute, however, did not affect the level in the well. No sample for quality was obtained at this test as the State Board of Health had not been previously notified.

Samples to indicate the quality of the water obtained from the test well were collected on February 19th, by the local health officer. Incidental to sampling, the well was pumped for about 12 hours, and the water level was lowered to 18 feet as in the previous test. The analyses of the samples collected indicate the water to be of excellent quality from a sanitary standpoint, and no evidences of pollution are shown. The first sample, which was collected 2½ hours after pumping had started, was turbid, but the second sample collected at the end of the

pumping period was free from turbidity. The water may be classed as soft, and its only objectionable mineral characteristic is its high iron content. The iron is present in sufficient quantity to cause objection on the part of the consumer. Owing to the limited number of analyses of the water available, it is impossible to determine whether or not this iron content will be reduced by continued pumping. Future investigations will determine the necessity of providing a process for iron removal.

ACTION OF THE BOARD.

At its meeting held March 21st, 1913, the State Board of Health approved the proposed water supply for Malvern, obtained from drilled wells at a depth of from 68 to 107 feet and located on Site B, so-called, approved September 14th, 1911, with the following conditions:

1st. That a process for iron removal be installed if in the opinion of the State Board of Health future examinations demonstrate its necessity;

2nd. That the village council by ordinance provide (a) for the removal of a leaching privy vault located some 400 feet northeast of the test well and the substitution of a concrete watertight vault or watertight surface receptacle, and (b) for the prevention of the establishment of leaching privy vaults and cesspools and other possible sources of contamination within a radius of 500 feet from the proposed wells; and that said ordinance be submitted to the Secretary of the State Board of Health for approval before its passage;*

3rd. That detailed plans showing the method of development and handling of the supply be submitted to and receive the approval of the State Board of Health; and

4th. That this approval be void unless said plans shall have been submitted to the State Board of Health prior to August 1st, 1912.

Complying with the third condition of the above approval, on March 16th and 18th, 1912, detailed plans and specifications showing the method of development of the supply were submitted by Mr. L. E. Chapin, consulting engineer. Based on a review of these plans the following report was submitted:

Briefly, the proposed development of the supply provides for the installation of three wells, a pumping station near the wells, and a distribution system, storage being provided by a standpipe.

Wells. The proposed wells are to extend to a depth of 110 feet and will obtain their supply from various waterbearing strata below a depth of 68 feet. The wells will be placed on the approved site (Site B) and will be 97 feet apart. The casings, which will be of 8-inch wrought

*(Ordinance submitted and approved by the Secretary April 4th, 1912)

iron pipe, will extend to a depth of some 54 feet, and the tops will terminate 5 to 7 feet below the surface of the ground, where special 4-inch by 4-inch by 4-inch T's will be flanged to the tops of the casings. From the T's, 4-inch black iron pipes will extend to the surface of the ground, at which point they will be capped. Below the T's, 4-inch suction pipes will extend 25 feet, at the ends of which foot valves will be placed. From the other arm of the T's, 4-inch connections to the main suction line will be placed. These connections will be provided with gate valves, by means of which any of the wells may be cut off from the suction. It will be seen that the wells are amply protected from surface contamination.

Pumping Station and Machinery. The pumping station will be 29 feet by 24 feet in plan, with a depressed pump pit having a capacity for two pumping units, one of which will be installed at the present time. The wells will be pumped by direct suction and either a steam pumping plant or a triplex power pump (motor or gas engine driven) will be installed. The capacity of the pumping unit will be 250 gallons per minute. The plans and specifications of the engineer do not include provision for facilities for measuring the quantity of water pumped. Revision should be made to include this important feature.

Distribution System. The distribution will include 4-inch, 6-inch, and 8-inch pipe with lengths of 1,530 feet, 10,500 feet, and 2,800 feet, respectively. The total length of the pipe will therefore be 2.8 miles. The water supply will thus be made available to approximately the entire population of the village.

Standpipe. For storage and equalization of pressure, a standpipe 20 feet in diameter by 52 in height will be provided. It will be located on a hill in the northeastern portion of the village, which is at an elevation of 85 feet above the main portion of the village. The standpipe is constructed of riveted steel plates, and the connection from the distribution system is an 8-inch pipe turned up through the bottom. No method of emptying or draining the standpipe except through the distribution is provided and in view of the likelihood of iron deposits requiring frequent cleaning, it will be desirable to provide some means for draining the standpipe through a blow-off into the race nearby. The standpipe is not provided with a cover, although this is not a serious objection from a sanitary standpoint.

Cost. The estimates of the engineer place the cost of the proposed water supply for Malvern at \$18,500, which is equivalent to \$24.67 per capita.

ACTION OF THE BOARD.

At its meeting held April 11th, 1912, the State Board of Health approved these plans and specification for the development of the supply, received from Mr. L. E. Chapin, consulting engineer, on March 16th and 18th.

The attention of the village authorities was called to the following recommendations made to the consulting engineer:

(1) That the plans and specifications for pumping machinery should include provision for facilities for measuring the quantity of water pumped; and,

(2) That means should be provided for draining the standpipe incident to cleaning, and that for this purpose a blow-off connection from the 8-inch pipe leaving the standpipe should be made.

REPORT ON PROPOSED DEFERRIZATION PLANT FOR MINSTER.

On July 24th, 1912, there were received from Mr. George Champe of Toledo, consulting engineer for Minster, plans for a proposed defer-rization plant to improve the quality of the water supply of the village. On August 13th, 1912, a detailed plan of the aerating device was received. The plans were referred to the engineering department and the following report was submitted:

Minster is a village with a population of 1,583 in 1910, located in Auglaize County on the Erie Canal. The village is principally a farming center and contains no industries of importance. The topography of the surrounding country is very flat and the natural drainage of the village has been somewhat impaired by the presence of the Erie Canal.

PAST ACTIONS OF THE STATE BOARD OF HEALTH.

In January, 1910, the State Board of Health considered a proposed water supply for Minster. At this time a site in the northerly portion of the village was proposed for the location of public supply wells. At a meeting held January 20th, 1910, the Board approved of the location for the water supply wells, provided that an adequate test be made to determine the yield and quality of the proposed supply, and that full detailed plans for the development be submitted. Shortly afterwards it was decided by the engineer and contractor to select a new site for the wells, located in a public park in the east-central portion of the village. This site was informally approved by the Secretary of the State Board of Health under date of February 4th, 1910, and through a misunderstanding the construction of the water works was commenced and completed within a few months. Examinations of the water supply as installed were made by representatives of the State Board of Health on August 16th, 1910, and on May 4th and July 5th, 1911. These examinations were made for the purpose of studying the effect of pumping on the iron content in the water. In August, 1911, the State Board of Health considered the question of approving the

Minster water works and withheld its approval until three conditions should be complied with, one of which provided that an iron removal plant of a design satisfactory to the State Board of Health be installed and placed in operation.

EXISTING WATER SUPPLY.

The present water supply of the village is obtained from a well 255 feet deep, which penetrates some 80 feet of clay, under which limestone rock is encountered from which the water is obtained. The well is 8 inches in diameter and is cased to a depth of 110 feet. As has been stated, the well is located in a public park within the village and there are several sources of possible contamination within 500 feet. Owing to the great depth of the well and the protective stratum of clay, the proximity of polluting influences may not have an injurious effect upon the supply.

The water is pumped from the well by a motor driven deep well pump into an elevated tank 150 feet high with a capacity of 150,000 gallons. The distribution system consists of about three miles of 4-inch and 6-inch pipe.

The present daily pumpage is 32,000 gallons. The maximum rate of pumping the supply well, which will be the rate of operation of the deferrization plant, is 85,000 gallons per day or 60 gallons per minute. The well pump is in operation nine hours each day normally, pumping at a rate of about 36 gallons per minute.

The quality of the water supply has been demonstrated by a number of analyses made in the laboratories of the State Board of Health. In general the analyses have indicated that the water is of good quality from a sanitary standpoint but one with a high degree of hardness and an objectionable amount of iron. The latter constituent is present in such great quantities as to impart to the water a decided turbidity and to cause objectionable deposits in the mains. Samples taken from various points on the distribution system have shown a variation in the iron content from 1.7 to 7.2 parts per million. The readiness with which the iron is deposited to form turbidity is an indication of the ease with which it may be removed by aeration.

PROPOSED DEFERRIZATION PLANT.

The plans of the consulting engineer provide for the installation of a deferrization plant to consist of an aerator and a settling basin. The settling basin will also be used as a pump well, and duplicate centrifugal pumps electrically driven will be installed and used as service pumps. The existing deep well pump will be placed in service as a low lift pump to distribute the water pumped from the well through the aerator into the settling basin.

Aerator. The water from the supply well will pass through an aerator before entering the settling basin. The aerator is to be constructed of 12 trays of coke, each 4 inches in thickness, superimposed and spaced 4 inches apart. Each tray and layer of coke is 8 feet square and the total depth of the aerator is 8 feet. The coke will be washed and screened to a size varying from $\frac{3}{4}$ inch to $1\frac{1}{2}$ inches in diameter. The water will be applied at the top of the aerator by means of a perforated pipe. The design of the aerator is such as to provide a rate of 7.5 cubic feet of water per square foot per hour, or 59,000,000 gallons per acre daily based on a rate of pumping of 60 gallons per minute.

Settling Basin. The design of the settling basin provides for a reinforced concrete structure 61 feet in length, 41 feet in width, and 15 feet in depth to the overflow. The floor is reinforced concrete 6 inches in thickness and is sloped to a central point from which a drain leads to a sewer for the removal of sludge deposits. The basin will be covered with a timber roof supported upon concrete columns and surfaced with asphalt covering. The basin has a capacity of 280,000 gallons, which is equivalent to 57 hours storage on the basis of a daily pumpage of 100,000 gallons.

ACTION OF THE BOARD.

At a meeting held August 15th, 1912, the State Board of Health approved the plans for a proposed deferrization plant for Minster, submitted by Mr. George Champe, of Toledo, consulting engineer for the village, on July 24th and August 13th, 1912, subject to the following conditions:

1st. That the aerating device be enlarged or otherwise modified, if in the opinion of the State Board of Health such enlargement or modification shall become necessary; and,

2nd. That this approval be void unless construction shall have been commenced prior to January 1st, 1913.

The Board also approved the water supply of Minster, assuming that the proposed deferrization plant would be installed subject to the condition that all privy vaults and cesspools within 500 feet of the public supply well be made watertight.

REPORT ON PROPOSED WATER SUPPLY FOR NAVARRE.

On May 3rd, 1912, a request for examination of a proposed water supply for Navarre was made by Mr. H. W. Foster, mayor. On May 6th, 1912, one of the assistant engineers visited Navarre and examined the proposed supply. The following report was submitted:

Navarre is a village with a population of about 1,360, located in the southwestern portion of Stark County on the Tuscarawas River. The

village is essentially a farming community and has no important industries. At the present time there are no municipal improvements, although during the past year a bond issue for the installation of a public water supply was provided by the people. The topography of the surrounding country is rolling, and in the village itself there is a difference of elevation of about 75 feet between the lowest portion in the valley of the Tuscarawas River and the highest portion in the hills. The average width of the river valley is about three-fourths mile, and the greater portion of it is submerged during high stages of the stream. The stream flows in a general southerly direction bordering the westerly and southerly portions of the village. The drift deposits in the river valley consist of clays and gravels of glacial origin with a total thickness of 75 feet or more. In the more elevated portions the drift deposits are somewhat shallower and are immediately underlaid by the bed rock.

PREVIOUS INVESTIGATIONS.

The proposition of a public water supply for Navarre was first brought to the attention of the State Board of Health in a communication of November 30th, 1911, received from the mayor. Subsequently, inspections were made on December 6th, 1911, and February 28th, 1912. At this time it was proposed to locate the public supply wells in the extreme northwesterly portion of the village in the valley of the Tuscarawas River between that stream and the Ohio Canal immediately north of the West Lebanon Road. An inspection of the physical characteristics of the site indicated that it would be unsatisfactory, and the officials were so advised under date of December 16th, 1911. Nevertheless, a test well was drilled and examined by a representative of the Engineering Department. Although analysis of a sample of the water was satisfactory, the officials were again advised to select a more suitable site, but this they hesitated to do. On March 8th, 1912, the chief engineer visited Navarre and conferred with the mayor regarding the proposed location, the result of which conference was the selection of a site some 500 feet north of the first site and farther removed from the built up portion of the village. It was suggested that a site 800 to 1000 feet west of the Tuscarawas River be selected, but this site was objected to on account of cost considerations.

PROPOSED WATER SUPPLY.

Source of Supply. It is now proposed by the village to secure a water supply from driven wells in the valley of the Tuscarawas River, to be located on a site between the river and the Ohio Canal 500 to 700 feet north of the West Lebanon Road. No plans have been submitted showing the exact boundaries of the site, but it is the intention to purchase a strip of land some 200 feet long and bounded by the river and

the canal. The location of the site is satisfactory as regards the proximity of sources of pollution. No dwellings or other buildings are within a radius of 500 feet, and the nearest ones are about 600 feet southeast of the site. Drainage from these dwellings could not possibly affect wells on the proposed site as they are in the downstream direction. The proximity of the Tuscarawas River and the Ohio Canal might be considered a source of danger to the wells, but in the light of evidence regarding seepage from streams, it would appear that the wells would not be endangered by this source.

To determine the quality and quantity of water available, a test well was drilled in the central portion of the site. The well is 600 feet north of the West Lebanon Road, about 50 feet west of the Ohio Canal and about 100 feet east of the Tuscarawas River. The elevation of the ground at the well is about 4 feet below the water level of the canal and but slightly above the normal level of the river. The well was driven to a total depth of 76 feet and penetrates the following formations:

<i>Material.</i>	<i>Thickness.</i>	<i>Depth.</i>
Surface soil (sandy loam).....	3½ feet	3½ feet
Clayey gravel	8½	12
Hardpan	1	13
Clayey gravel	34	47
Gravel and sand (waterbearing).....	29	76
Total depth of well.....		76 feet

The casing, which is 8 inches in diameter, is driven to the bottom of the well, from which the entire supply is obtained. The water flows under artesian pressure from the top of the casing at a rate of about 20 gallons per minute.

Quantity of Water. The quantity of the supply available has been demonstrated by two pumping tests carried out on May 3rd and May 6th, 1912. The first test consisted in pumping the well for nine hours at a rate of 60 gallons per minute. The water level was lowered within one minute to 7 feet from the surface, but the head was recovered immediately after pumping was discontinued and the water again flowed freely from the top of the casing. The second test consisted in pumping the well five hours at a rate of 60 gallons per minute, by which the water level was lowered to 7 feet from the surface. By pumping for a short time at the rate of 100 gallons per minute, the level was lowered to 9½ feet from the surface. After pumping had ceased, recovery of the well took place immediately. The tests would indicate the availability of a sufficient quantity.

Quality of Water. Samples indicating the quality of the proposed supply have been collected February 28th and May 6th, 1912. On the first occasion the sample was taken from a test well immediately north

of the West Lebanon Road. The other samples were taken from the test well on the proposed site. The analyses of the samples indicate that a water of a high degree of purity is obtained from the proposed source. The samples taken May 6th, 1912, indicate an improvement over the samples previously collected, as an entire absence of nitrates and nitrites and no required oxygen are shown. From a mineral standpoint, the water is also satisfactory. The hardness is largely temporary and will not cause the scaling of boilers, while the iron content is very low and will cause no complaint. On the whole the water appears to be one admirably adapted for public supply purposes.

ACTION OF THE BOARD.

At a meeting held June 19th, 1912, the State Board of Health considered this proposed water supply for Navarre to be obtained from driven wells cased to a depth of 70 feet or more, located on land lying between the Tuscarawas River and the Ohio Canal 500 to 700 feet north of the West Lebanon Road, and approved the same subject to the following conditions:

1st. That detailed plans showing the method of developing the supply and furnishing it for use be submitted to and receive the approval of the State Board of Health;

2nd. That the village council pass an ordinance preventing the future establishment of any leaching privy vault, cesspool, or other source of pollution within 500 feet of any of the supply wells; said ordinance to be approved by the Secretary of the State Board of Health before its passage;* and,

3rd. That this approval shall be void unless the proposed supply shall have been installed prior to January 1st, 1914.

On July 29th, 1912, Mr. L. E. Chapin, consulting engineer for Navarre, submitted plans and specifications for the development of a proposed water supply for that village. The plans were examined by one of the assistant engineers and reported upon as follows:

The plans of the consulting engineer provide for the development of a water supply obtained from wells. Briefly, the plans and specifications include wells, pumping station and machinery, a distribution system, and an elevated tank.

Wells. The supply will be at present obtained from the drilled wells, though provision will be made for connecting additional wells when necessary. The two wells for present use are 132 feet apart and are placed on the site approved June 19th, 1912. The wells are each 8 inches in diameter and are drilled to a depth of about 75 feet through sand and gravel and into a coarse water-bearing gravel. The wells are artesian, having a flow when not being pumped of about 30 to 40 gal-

*(Ordinance approved August 19th, 1912).

lons per minute. Tests have proved the yield to be adequate for the needs of the village. The casing of each well will be of 8-inch wrought iron pipe extending to the bottom of the well. The top of the casing will terminate about 7 feet below the surface of the ground where it will be connected to a 4-inch by 4-inch by 4-inch tee. From this branch, 4-inch black steel pipe will extend to the surface of the ground where it will be capped. Below the tee, a 4-inch suction pipe will extend 25 feet, at the lower end of which a 4-inch foot valve will be placed. From the horizontal arm of the tee a 4-inch cast iron flange and spigot pipe will be connected, which will in turn be connected to an 8-inch suction line extending to the suction of the pump. This line will be provided with a 4-inch gate valve placed near each well, by means of which any well may be cut off from the suction line for cleaning or other purposes. The main suction line to the pump will be laid about 4 feet under the surface of the ground. With this arrangement, the wells will be in no danger from surface contamination.

Pumping Station and Machinery. The pumping station, which will be constructed of brick and concrete and located between wells Nos. 1 and 2, will be 20 feet by 24 feet in plan, inside dimensions, and constructed directly over a reinforced concrete pump pit 12 feet deep. In this pit will be placed two pumping units. One of these will be a triplex horizontal double acting Luitweiler plunger pump, direct driven by an electric motor which will be supplied with current from the local service. This pump will have a capacity of 250 gallons per minute against a domestic pressure of 175 feet and against a fire pressure of 230 feet. The other pumping unit will be installed as an auxiliary pump for use at times when the electric power may not be available. This will consist of a duplex direct acting horizontal piston steam pump with a capacity of 100 gallons per minute, which will be supplied with steam by a vertical steam boiler. Each pump will be provided with a 6 figure rectangular engine counter and suction vacuum and pressure gages.

Distribution System. The distribution system will consist of about four miles of cast iron pipe ranging in size from 2 inches to 10 inches as follows:

2-inch pipe	510 feet
4-inch pipe	4,618
6-inch pipe	13,345
8-inch pipe	1,896
10-inch pipe	1,750

Practically the entire village will thus be supplied with water. There will be seven dead ends on the distribution system. The system will be provided with 40 valves and 45 fire hydrants.

Elevated Tank. For storage and equalization of pressure, an elevated tank will be provided located on high ground in the northern part of the village. This tank will have a capacity of 60,000 gallons.

It will be constructed of steel and will have an elevation, at the water level, of 90 feet above the top of the foundation columns. The average pressure in the village will thus be somewhat more than this. The details of the construction of the elevated tank are not shown on the plans for the development of the supply, it being left to the contractor to furnish his own shop drawings for the construction of the tank. The tank is described in detail, however, in the specifications. It will be covered with a conical roof. The inlet pipe will be provided with a valve for emptying the tank when it is desired to clean it.

ACTION OF THE BOARD.

At a meeting held August 15th, 1912, the State Board of Health approved the plans and specifications for development of the proposed water supply for Navarre, submitted by Mr. L. E. Chapin, consulting engineer for the village, on July 29th, 1912.

EXAMINATION OF WATER FROM NAVARRE.

PARTS PER MILLION.

Sample Number.	Collected.	Color.	Turbidity.	Sediment.	Odor.	Oxygen Required.	Nitrogen as			
							Albuminoid Ammonia.	Free Ammonia.	Nitrites.	Nitrates.
11362	1912. May 6....	7	none	trace	none	0.0	.008	.090	0	0
11363	May 6....	6	none	trace	none	0.0	.004	.066	0	0

Sample Number.	Chlorine.	Alkalinity.	Incrustants.	Sulphates.	Residue on Evaporation.		Iron.	Bacteria.	
					Total.	Loss on Ignition.		Number per cc.	Colon Present.
11362	70.	262.	27.5	.....	424	42	.2	4	Not in 10 cc.
11363	70.	264.	27.5	.....	419	46	.2	4	Not in 10 cc.

Source of Samples.

Number.

11362. Test well No. 1, 8 inches in diameter, driven to depth of 76 feet. Sample collected at 9:30 A. M.

11363. Same as No. 11362. Sample collected at 10:30 A. M.

REPORT ON PROPOSED EXTENSION OF PUBLIC WATER SUPPLY AT NEWARK.

On July 25th, 1912, a communication was received from Mr. James McCarthy, director of public service of Newark, enclosing a plan of the city engineer for a proposed extension of the public water supply of that city and requesting approval of the same. On August 1st, 1912, one of the assistant engineers visited Newark and made an investigation of the proposed improvement. The following report was submitted:

Newark, a city with a population of 25,404 in 1910, is located in Licking County at the confluence of the north and south forks of the Licking River, which join to form the main stream in the southeasterly portion of the city. The city is almost entirely built upon the broad level plains of the stream valleys and the topography is mildly undulating. Outside the limits of the stream valleys, however, the country is hilly.

The city is provided with various municipal improvements including a public water supply, sewers, and a number of miles of paved streets.

INSTALLATION OF WATER SUPPLY AND ACTIONS OF THE STATE BOARD OF HEALTH.

A public water supply was first installed at Newark in 1886 by a private company known as the Newark Water Company. The first supply was obtained from two dug wells about three-fourths mile north of the northerly corporation line of the city, and was later supplemented by twenty-four 4-inch driven wells in the same locality. The well supply becoming inadequate, a dam was constructed across the north fork of the Licking River and the raw river water diverted to one of the dug wells. In 1901 plans for a mechanical filter plant were approved by the State Board of Health and the plant was subsequently built. In 1904, the city, anticipating the expiration of the water company's franchise in 1906, submitted plans for a new water supply to be drawn from the north fork of the Licking River just above the intake of the water company. These plans were approved in July, 1904, provided "that the water be purified, in a manner satisfactory to the State Board of Health, before being offered to consumers." In July, 1905, plans for a proposed slow sand filter plant were approved by the Board, and during that year the work of installing the new water supply progressed. The construction of a filtration plant, was, however, omitted, and under date of January 22nd, 1906, the board of public service was notified that the State Board of Health would resist the use of the new supply unless the filter plant was constructed.

After the completion of the intake, pumping station, and distribution system in 1906, the municipal supply was placed in use for fire

protection purposes but no connections were permitted for domestic use. During this time the Newark Water Company continued to supply the domestic consumption.

In July, 1909, plans for the construction of infiltration wells in a gravel bar in the river were submitted by Mr. Philip Burgess, consulting engineer for the city. The State Board of Health received no report and therefore took no action on these plans, it being understood, however, that the work of installation of the system should progress with the idea of experimentation, and that the Board should determine the suitability of the supply for domestic purposes after its completion. The new supply was installed during the summer of 1909, but the water was not furnished to consumers for domestic purposes until October, 1910. In September, 1910, the Board granted permission to the city of Newark to introduce into its distribution system the water from the new infiltration wells to be used for general domestic purposes. This permission was temporary, depending on the quality of the water as determined by the State Board of Health. Following the granting of this permission, the city took over the plant of the Newark Water Company but abandoned it, and since October 1st, 1910, the entire supply has been furnished from the water works station installed in 1906. The insufficient capacity of the infiltration wells installed in 1909 has made it impossible to pump the entire supply from them, and it has frequently been necessary to draw raw water from the river. It is therefore proposed by the city to enlarge the existing system.

PRESENT WATER SUPPLY.

The water supply of Newark is at present obtained from three sets of strainers of two units each, through which water is drawn from the gravel deposits in the north fork of the Licking River. Briefly, the intake works consist of six 48-inch cast iron perforated pipes, 12 feet in length, and placed horizontally with the bottoms about 10 feet below the surface of the gravel bar. Water is pumped from these units into the distribution system by direct suction. As has been stated, considerable difficulty has been encountered in securing a sufficient quantity of water from this source, and it has been frequently necessary to pump water from the river. This has been due in part no doubt to the failure to install means of back flushing the strainers, although it is possible that the available quantity of ground water, especially during dry seasons, may be inadequate.

The quality of the water obtained from the present strainers is demonstrated by a number of examinations which have been made by the State Board of Health. In September, 1910, the system was examined at a time when the stream was at low stage. At this time the water derived from the strainers was of a satisfactory quality. In Jan-

uary, 1911, with the stream at high stage, the water derived from the strainers was unsafe. In March, 1911, with the stream at average stage, the strainers produced a satisfactory water but a sample from the distribution system showed pollution. In August, 1911, when the stream was at low stage, the water derived from the strainers was fairly satisfactory but that from the distribution system was unsatisfactory. In October, 1911, with the river at medium high stage, the water from the strainers was unsafe. In considering the above results, it should be noted that the raw river water is used at frequent intervals, and that in this way the distribution system may have contained this river water at the time of the collection of the samples. In general the results of the examinations have indicated that the quality of the water obtained from the infiltration wells shows marked variation and is somewhat dependent upon the stage of the stream. That the infiltration wells in their present condition cannot be expected to produce a satisfactory water at all times is apparent. Following the various examinations of the State Board of Health, the local officials were advised of the unsatisfactory results and of the impossibility of accurately knowing whether or not the infiltration wells could produce a satisfactory water until additional units had been installed.

PROPOSED EXTENSION OF WATER SUPPLY.

The plan of the city engineer provides for the extension of the infiltration wells by adding six units, or practically duplicating the present system. The new units are to be installed in all respects similarly to the existing units except that a manhole will be provided to enable inspection of the interior of the strainers. The strainers will consist of 48-inch cast iron perforated pipes, 12 feet in length, capped and plugged, and placed horizontally in a trench 10 feet below the surface of the gravel bar. The perforations will be on the under side of the strainer, and it is proposed to back fill the excavation by the use of boulders immediately surrounding the strainers and the excavated sand and gravel above them. A 24-inch T connection will extend from the strainer to the surface of the gravel bar, where it will be closed with a blind flange. This will contain the stem of a valve on the suction and will serve as a means of inspecting the strainer. The suction main from the proposed additional infiltration wells will be connected to the existing 18-inch suction main. Back-flushing of the existing and proposed units will be provided for by the installation of a 6-inch connection from the force main to the main suction line.

Quantity of Water. The plan of the city engineer does not include an estimate of the available quantity which the extension will provide. Evidently no measurements have been made to determine the lowering of the ground water level during excessive pumping, nor the extent or direction of ground water flow. It is possible that by the use of the additional units, the supply will be intercepted before it reaches the

existing units, and that there will result no material increase in the quantity of water available. This condition should be further investigated.

Quality of Water. The quality of water that is obtainable from the proposed extension will correspond to the quality of the existing supply. Some improvement may result if care is exercised in backfilling the excavation around the strainers, although it is unwise to depend on protection by this means. It is reasonable to state that the quality of the water will depend largely upon the stage of the stream, and that the infiltration wells cannot be expected to produce an entirely safe water at all times.

ACTION OF THE BOARD.

At a meeting held August 15th, 1912, the State Board of Health considered the existing water supply of Newark and the proposed extension of the supply as shown on a plan received from Mr. James McCarthy, director of public service, of Newark, Ohio, on July 25th, 1912; and voted to hold in abeyance approval of the existing water supply as well as the proposed extension. The Secretary was instructed to advise the authorities as follows:

(1) A number of examinations of the existing water supply, installed in 1909 and obtained from infiltration wells, have demonstrated that water of insufficient quantity and at times unsatisfactory quality, dependent somewhat upon the stage of the river, is obtained.

(2) The extension of the infiltration wells may not materially increase the available yield or improve the quality of the supply; and sufficient data have not been submitted to the Board to demonstrate that a sufficient quantity is available.

(3) The feasibility of infiltration wells at Newark to provide a water supply of satisfactory quantity and quality has not been sufficiently demonstrated to warrant the approval of the State Board of Health; and the Board will permit of the installation and temporary use of additional units only upon the condition that the supply be improved or that a new supply be secured, satisfactory to the State Board of Health, when deemed necessary by said Board.

(4) In view of the uncertainty of the supply from infiltration wells, the question of installing a purification plant should be investigated, and an engineer experienced in water purification should be retained for this purpose.

REPORT ON PROPOSED WATER SUPPLY FOR NEW BERLIN.

On December 21st, 1911, in answer to a request from Mr. A. A. Swope, village clerk, one of the engineering assistants visited New Berlin for the purpose of examining a site proposed for the location of public supply wells. The following report was submitted:

New Berlin, a village with a population of about 865, is located in Stark County about six miles north of the city of Canton. The village is at present experiencing a flourishing growth and has almost doubled its population in the past ten years. Several manufacturing industries have been established, including a large harness factory employing 350 men, and several other smaller industries. The likelihood of the future development of the village is promising, owing to its favorable location as a suburb of Canton, with which it is connected by good trolley service.

The village lies upon fairly level ground and is drained partly to the east to the West Branch of Nimishillen Creek, and partly to the west to a small tributary of that stream. The geology in the vicinity shows that the locality is underlaid by shale formations, having a total thickness of some 2,000 feet or more. The shale is covered with drift deposits ranging in depth from 20 to 40 feet within the village. The drift deposits are of clay and gravel and are waterbearing. Portions of the shale formation are also waterbearing.

At present the village is supplied with no municipal improvements, although a bond issue has been recently passed for the installation of both a public water supply and a complete sewerage system. At the present time only a few of the dwellings within the village are provided with modern conveniences; the customary outdoor privy is generally used.

PROPOSED WATER SUPPLY.

For the development of a water supply the village has retained the services of Mr. John H. Holl, Civil Engineer, of Canton, and has taken preliminary steps to secure a satisfactory supply. At the present time no detailed plans have been prepared for the development of the supply. It is proposed to obtain water from drilled wells receiving their supply from the shale formations.

Site. Informal advice regarding the selection of a site for the public supply wells was given to the civil engineer and village officials by the assistant engineer on October 4th, 1911, when a visit was made with reference to proposed sewerage. At this time it was desired by the civil engineer and village officials to locate wells in the westerly portion of the village a short distance south of Portage Street. This site was advised against owing to its proximity to present dwellings, and the likelihood of the encroachment of dwellings built in the future. It was also advised that a site be selected at a distance of at least 1,000 feet from the built up portion of the village. It was emphasized that owing to the rapid growth of the village, it would be necessary to foresee and avoid encroachment upon the public supply wells.

It is now proposed to locate the public supply wells on a site having an area of about one acre, and situated only about 1,200 feet northwest

of the center of the village and about midway between Market and Portage Streets. The village has grown as a cross roads town, and the built up portion is practically confined to five streets which radiate from a public square at the center. In the angle between two of the streets the proposed water works site is situated. At the present time the nearest houses are about 500 feet distant, there being a number of dwellings at this distance east and south of the site. It should be noted, however, that the property in the vicinity of the site is platted and a street is proposed to extend along the northern boundary. Future growth of the village will no doubt result in the construction of a number of dwellings surrounding the site. The location of the site as regards surface drainage is satisfactory.

Test Well No. 1. A test well has been recently drilled on the proposed site. This well is 6 inches in diameter and extends to a depth of 85 feet and penetrates the following formations:

<i>Material.</i>	<i>Thickness.</i>	<i>Depth to bottom.</i>
Surface soil (clay and gravel).....	15 feet	15 feet
Gravel	15	30
Coarse brown sand (slightly waterbearing).....	10	40
Hard gray shale.....	40	80
Soft sandy shale (waterbearing).....	5	85
Total depth of well.....		85 feet

The well is cased in the hard gray shale to a depth of about 42 feet and the water supply is drawn from the soft sandy shale which underlies the hard gray shale. From this stratum the water rises to an elevation of 14 feet below the surface. It is intended to case off the water from the shallow drift deposits.

No complete pumping test of the well has been made to determine its yield, but an inadequate test would indicate that a plentiful supply of water may be obtained. On December 19th, the well was pumped intermittently for about 8 hours with a small steam pump at about 60 gallons per minute. On December 20th, the pump was not operated, and on December 21st, the well was pumped for a short time to permit the collection of a sample by the engineering assistant. After this the pumping was continued for 48 hours, and it was stated by the civil engineer that when pumping at the rate of 60 gallons per minute, the water level was lowered from 14 to 27 feet below the surface in 4 hours and was held at that level by pumping continuously at the rate of 40 gallons per minute. The water level was restored to its original height some 15 minutes after pumping had ceased.

Quality of Water. Three samples of water from the test well have been analyzed in the laboratory of the State Board of Health, one

collected by the engineering department on December 21st, and two by the village clerk on December 23rd. The results of these analyses indicate in general a fairly satisfactory water. The chemical findings are all favorable, with the exception of the rather high iron content, which, however, might be expected from such a well. The bacterial content of the first sample is unsatisfactory, showing the presence of colon bacillus. These results may, however, be attributed to the newness of the well and the small amount of pumping. The analyses of the second set of samples, collected on December 23rd, 1911, indicated an improvement in the iron content brought about by pumping, but the water still contains 1.2 parts per million, an amount sufficient to discolor plumbing fixtures.

SUMMARY.

From the foregoing report it will be seen that the village of New Berlin proposes to obtain a water supply from a shale formation at a depth of 85 feet, which is protected by a stratum of hard gray shale some 40 feet in thickness. The location of the test well is not suitable, as danger will be produced by the future encroachment of the built up portion of the village. It would appear that the protecting stratum of shale would insure the safety of the supply, but experience has demonstrated the advisability of securing a proper location instead of depending upon protection of impervious stratum. Leaky casings, and casings fitting the impervious stratum imperfectly, may give rise to the contamination of the well. The danger of pollution is emphasized in considering the probable future development of the village.

ACTION OF THE BOARD.

At the meeting of the State Board of Health, held January 17th, 1912, the site proposed for the location of public water supply wells for New Berlin, located about 1200 feet northwest of the center of the village between Market and Portage streets was disapproved, the Board deeming it necessary that the village select a site with a more favorable location as regards the proximity to present and future built up portions of the village.

In February, 1912, the Board was petitioned by officials and residents of New Berlin to reconsider its former action, but at its meeting held February 15th, 1912, the State Board of Health decided to not reconsider its action of January 17th.

On March 11th, 1912, the chief engineer visited New Berlin and examined proposed locations for public water supply wells. At that time a verbal request for approval of one of the sites was made by Mr. John H. Holl, consulting engineer for the village.

The following report was made:

It is now proposed by the village of New Berlin and its engineer to obtain water from drilled wells on a site located north of the village.

The site selected is situated on property of Solomon Gilver, about 600 feet east of Market Street and some 600 feet north of the northerly corporation line of the village. No test wells have been drilled but it is expected that wells extending 75 feet or more below the surface will be used. The surface conditions surrounding the site are favorable, there being but one house within 500 feet. Within a radius of 1,000 feet there are perhaps six houses but owing to the geological formations it does not appear likely that these houses will constitute a menace to the quality of the supply. Surface drainage from an unpopulated district lying in an easterly direction passes the site in a wet weather ditch, but will have no effect upon the supply. It is probable that the future growth of the village will not encroach upon the supply wells placed upon the proposed location.

ACTION OF THE BOARD.

At a meeting held March 21st, 1912, the State Board of Health considered the proposed location for public water supply wells for New Berlin, situated on the property of Solomon Gilver some 600 feet north of the northerly corporation line of the village and 600 feet east of Market Street, and this location for public water supply wells was approved with the following conditions:

1st. That the supply be derived from drilled wells obtaining their water below an impervious stratum;

2nd. That the quality and quantity of the supply obtainable, as demonstrated by a test well, be satisfactory to the State Board of Health;

3rd. That an area of at least one acre be purchased for water supply purposes;

4th. That before contracts for the installation are awarded, plans for the development of the supply be submitted to and receive the approval of the State Board of Health; and.

5th. That this approval be void unless a test well shall have been drilled and plans submitted prior to August 1st, 1912.

On May 10th, 1912, the engineering assistant visited New Berlin for the purpose of obtaining samples from a well proposed as a source of public supply for the village. The following report was submitted:

The village has obtained an option on one acre at the approved location and in order to comply with the first and second conditions of approval has had drilled a test well in the central portion of the site. As stated in a previous description of the site, it is well located as regards habitations, the nearest of which are about 500 feet distant. The test well is a 6-inch hole drilled to a depth of 160 feet, penetrating the following formations:

<i>Material.</i>	<i>Thickness.</i>	<i>Depth.</i>
Blue mud, sand and gravel mixture (waterbearing).....	45 feet	45 feet
Gray shale	14	59
Black slate	16	79
White sandrock (waterbearing).....	71	146
Fine white sandrock (waterbearing).....	12	158
Coarse white sandrock.....	2	160
Total depth of well.....		160 feet

The casing of the well is a 6-inch pipe driven to a depth of 50 feet, effectually preventing the entrance of shallow subsoil water into the well. The supply is drawn from various waterbearing strata below the imperious shale. The main supply enters the well at 75-foot and 146-foot depths. The normal water level in the well is about 3 feet from the surface.

Quantity of Water. On May 8th, 9th and 10th, 1912, a test for quantity was made. The well was pumped by air lift, the air line extending 50 feet below the surface, discharging within the casing which was used as the discharge pipe. The test was carried on for forty-six hours, during which an average yield of 150 gallons per minute was obtained. The water level in the well was lowered to about 6 feet from the surface and after the test had been completed, complete recovery took place within twenty-four hours and the water returned to its original elevation, 3 feet from the surface. The results of this pumping test indicate that there is available a sufficient quantity of water to supply the village.

Quality of Water. Two samples to indicate the quality of the water were taken from the well during the test for quantity. On May 9th, 1912, about twenty-four hours after the start of the pumping test, a sample was taken by the village clerk, and on May 10th, at the completion of the test, a second sample was collected by a representative of the State Board of Health. The analyses of both samples indicate that the water is of a high degree of purity from a sanitary standpoint and no evidences of contamination are demonstrated. The continued pumping of the well slightly increased the color and turbidity, but this may have been due to the newness of the well. The rather high iron content may also be attributed to the same cause, and continued use may bring about a marked reduction in this content. However, should the iron fail to decrease, a process for its removal will be required if complaint from the consumer is to be avoided.

ACTION OF THE BOARD.

At a meeting held June 19th, 1912, the State Board of Health approved the proposed water supply for New Berlin to be obtained from drilled wells at least 75 feet in depth and located on the site approved by

the State Board of Health on March 21st, 1912, subject to the following conditions:

- 1st. That an iron removal plant be installed by the village if future examinations by the State Board of Health demonstrate its necessity;
- 2nd. That complete detailed plans showing the method of developing the supply be submitted to and receive the approval of the State Board of Health; and,
- 3rd. That this approval be void unless the proposed supply shall have been installed prior to January 1st, 1914.

Satisfying the foregoing second condition, the plans and specifications for the proposed development of this supply, submitted by Messrs. John H. and C. W. Holl, engineers for the village, June 15th, 1912, were also approved.

These plans submitted June 15th, 1912, were reported upon by the chief engineer as follows:

The plans of the engineers provide for the development of a water supply obtained from wells on the site approved by the State Board of Health on March 21st, 1912. Briefly, the plans provide for the installation of wells, pumping station and machinery, a distribution system, and an elevated tank.

Wells. Provision is made for the installation of four wells to be drilled in a single line and spaced 100 feet apart. It is intended to drill but two wells at the present time as these are thought ample to supply the village for several years. The wells will be drilled to a depth of approximately 160 feet and will be cased to a depth of 50 feet or more.

Pumping Station and Machinery. The plans provide for a brick pumping station, 18 feet by 22 feet inside dimensions, to contain the pumping machinery. It is proposed to pump the wells by direct suction and for this purpose the engineers recommend one triplex double acting power pump with a capacity of 350 gallons per minute pumping against a head of 175 feet, operated by a 20 horse power electric motor or gas engine. It would be advisable to install the pumping equipment in duplicate, and recognition should also be taken at this time of the possible necessity of providing for double pumping in case of a lowering of the water level in the wells.

Distribution System. The distribution system will comprise 2.65 miles of cast iron pipe consisting of the following sizes:

8-inch	6,130 feet
6-inch	7,480
4-inch	400

The distribution system will have five dead ends, which are made necessary by the peculiar layout of the village. It will be provided with twenty-four fire hydrants and fifteen gate valves. The entire population of the village will be accessible to the public supply.

Storage. An elevated steel tank will be located in the southerly portion of the village to provide storage and equalized pressure. The tank will be covered and will have a capacity of 50,000 gallons. Its elevation will be such as to produce an average pressure throughout the village of 50 pounds. The location of the tank at the opposite end of the village from the source of supply is favorable to securing a good circulation through the distribution system.

The Board called the attention of the authorities to the desirability of installing the pumping machinery in duplicate, and also of the advisability of recognizing the possible necessity of installing facilities for double pumping in case the water level in the wells should become lowered.

EXAMINATION OF WATER FROM NEW BERLIN.

PARTS PER MILLION.

Sample Number.	Collected.	Color.	Turbidity.	Sediment.	Odor.	Oxygen Required	Nitrogen as			
							Albuminoid Ammonia.	Free Ammonia.	Nitrites.	Nitrates.
11040	1911 Dec. 21	6	24	v. dis't.	sl. musty	.72	.012	.092	trace	0
11042	Dec. 23	3	14	distinct	none	.18	.018	.112	.0006	0
11043	Dec. 23	12	14	distinct	none	.18	.028	.134	.0004	0

Sample Number.	Chlorine.	Alkalinity.	Incrustants.	Sulphates.	Residue on Evaporation.		Iron.	Bacteria.	
					Total.	Loss on Ignition.		Number per cc.	Colon Present.
11040	45	191	82.5	.....	414	77	3.7	750	Pres. in 10 cc.
11042	41	193	82.5	.....	378	75	1.2	2	Not in 10 cc.
11043	40	191	82.5	.....	376	69	1.2	1000	Not in 10 cc.

Source of Samples.

Number.

11040. Test well No. 1. Sample collected by Mr. R. F. MacDowell.
 11042. Test well No. 1. Sample collected by Mr. A. A. Swope.
 11043. Test well No. 1. Sample collected by Mr. A. A. Swope.

EXAMINATION OF WATER FROM NEW BERLIN.

PARTS PER MILLION.

Sample Number	Collected.	Color.	Turbidity.	Sediment.	Odor.	Oxygen Required.	Nitrogen as			
							Albuminoid Ammonia.	Free Ammonia.	Nitrites.	Nitrates.
11379	1912. May 9....	0	3	vy. slight	none	.05	.006	.056	0	0
11380	May 10....	7	7	slight	none	.1	.008	.062	0	0

Sample Number.	Chlorine.	Alkalinity.	Incrustants.	Sulphates.	Evaporation. Residue on		Iron.	Bacteria.	
					Total.	Loss on Ignition.		Number per cc.	Colon Present.
11379	4	214	7.5	.....	257	17	1.2	2	Not in 10 cc.
11380	3	206	10.0	.....	244	12	1.3	100	Not in 10 cc.

*Source of Samples.**Number.*

11379. Test well on site approved March 21, 1912.

Sample collected May 9, 1912, by A. A. Swope, Village Clerk.

11380. Same as No. 11379.

Sample collected May 10, 1912, by A. C. Lucas, Engineering Assistant, State Board of Health.

REPORT ON PROPOSED WATER SUPPLY OF
NEW CARLISLE.

On August 9th, 1912, there was received from Mr. H. S. Forgy, mayor of New Carlisle, a request for approval of proposed water supply of that village. Preliminary investigations of the proposed supply were made by one of the engineering assistants on February 28th, May 2nd, and May 18th, 1911, and a complete examination of the supply as installed was made by the engineering assistant on July 22nd, 1912. The following report was submitted:

New Carlisle is a village with a population of 1,058 in 1910, located in the extreme westerly portion of Clark County on Honey Creek, a tributary of the Great Miami River. The village is essentially a farming

community and contains no important industries. The topography of the surrounding country is rolling and the drainage from the village is in a general southerly direction to Honey Creek. The underlying geological formation is the Niagara limestone, which is covered by drift of glacial origin with an average thickness of about 40 feet. The drift is principally sand and gravel and contains water in large quantities. Aside from the public water supply, the village has no municipal improvements.

The proposed water supply was first brought to the attention of the State Board of Health in February, 1911, when a location for the supply wells was inspected. Later, in May, 1911, a test well on the proposed location was examined and samples collected to indicate the quality of the proposed supply. Following this, plans of the development were not submitted and no report on the proposed supply was presented to the Board. Nevertheless, the supply was installed and is now in operation. The following is therefore a description of the supply as it exists:

PROPOSED WATER SUPPLY.

The water supply for which approval is requested, comprises wells, pumping equipment, and a distribution system. The various features will be briefly described.

Site. The location of the public supply wells was examined during the several inspections of representatives of the engineering department of the Board. The site is on the Haukman farm about one-fourth mile north of the built-up portion of the village and immediately north of the northerly corporation line. It is well removed from habitations, there being but two farm dwellings within 1,000 feet. These are, respectively, 550 feet southeast and 700 feet northwest of the site. The surface drainage is in an easterly direction to Honey Creek. The area owned by the village for water supply purposes will provide reasonable protection of the wells, but additional protection against future contamination should be provided by an ordinance.

Wells. Three supply wells have been drilled in the easterly portion of the property. The wells are placed 25 and 50 feet apart and extend to a depth of about 42 feet. The formations penetrated by the wells are as follows:

<i>Material.</i>	<i>Thickness of Stratum.</i>	<i>Depth to Bottom of Stratum.</i>
Surface soil	5 feet	5 feet
Fine gravel	2	7
Fine sand	20	27
Gravel (waterbearing)	1	28
Blue clay	10	38
Medium gravel (waterbearing).....	4	42

The water is obtained from the gravel formations encountered at depths of 27 feet and 38 feet, respectively, from which the water rises under slight artesian pressure to an elevation 19 feet below the surface. The wells are cased to a depth just above the shallower waterbearing stratum and are provided with perforated strainers from that point to the bottom of the wells. The casings are used as suction pipes and are connected to a main suction line by elbows. The tops of the casings are therefore protected from surface contamination. Manholes 5 feet in diameter and 8 feet deep are placed at the tops of the casings in which are contained gate valves to cut off any well from the suction.

Pumping Equipment. The pumping station is a neat one-story building located about 100 feet west of the wells. The pumping machinery consists of duplicate single acting triplex power pumps driven by horizontal gas engines. The discharge from the pumps passes into two horizontal steel pressure tanks, connected in series, and designed to provide storage and pressure on the distribution system. The present tanks are each 9 feet in diameter and 36 feet in length, the total capacity being 35,000 gallons. The pressure within the tanks is maintained by duplicate air compressors of the vertical plunger type.

Distribution System. The distribution system consists of 8-inch, 6-inch, and 4-inch pipe covering practically the entire built up portion of the village. Since the installation of the supply, approximately 43 connections have been made for domestic purposes.

Quantity of Water. At the time of one of the preliminary investigations of the supply, data were secured demonstrating the available quantity of the water supply. Test well No. 2, which is included in the present installation, was pumped continuously for 80 hours, as a result of which the water level was lowered from 19 to 21 feet below the surface. The discharge indicated a yield of 80,000 gallons per twenty-four hours. The available quantity is evidently sufficient for the present and future needs of the village.

Quality of Water. Samples to indicate the quality of the water supply were collected on July 22nd, 1912. The analyses indicate that the water is of a high degree of purity from a sanitary standpoint and they show no evidence of organic contamination. The physical characteristics of the water are also satisfactory. The mineral constituents are somewhat objectionable as the water is quite hard and contains a rather high iron content. The sample taken from the distribution system, however, shows a decrease of the iron, but this would point to the necessity of frequent flushing of the mains and cleaning of the pressure tanks.

SUMMARY.

From the foregoing report, it will be seen that a public water supply has been installed at New Carlisle without the official approval of the

State Board of Health. Preliminary investigations, however, demonstrated that the location proposed was satisfactory, and a recent examination shows that the water supply has been properly installed. In its present condition the water supply is satisfactory and should be approved.

ACTION OF THE BOARD.

At a meeting held August 15th, 1912, the State Board of Health approved the proposed public water supply for New Carlisle, already installed (request for approval of same having been received from Mr. H. S. Forgy, mayor, on August 9th, 1912), subject to the following conditions:

1st. That the village council pass an ordinance preventing the establishment of privy vaults, cesspools, or other sources of pollution, within 500 feet of the public supply wells; said ordinance to be approved by the Secretary of the State Board of Health before its passage;

2nd. That detailed plans and specifications of the development of the supply be submitted to the State Board of Health; and,

3rd. That a process for the removal of iron from the water supply be installed when deemed necessary by the State Board of Health.

The authorities of New Carlisle were advised that complete records of the operation and maintenance of the water works should be kept.

EXAMINATION OF WATER FROM NEW CARLISLE.

PARTS PER MILLION.

Sample Number.	Collected.	Color.	Turbidity.	Sediment.	Odor.	Oxygen Required.	Nitrogen as			
							Albuminoid Ammonia.	Free Ammonia.	Nitrites.	Nitrates.
11513	1912. July 22...	12	12	slight	musty	.01	.010	.016	0	.4
11514	July 22...	12	none	none	none	.01	.014	.002	0	.4

Sample Number.	Chlorine.	Alkalinity.	Incrustants.	Sulphates.	Residue on Evaporation.		Iron.	Bacteria.	
					Total.	Loss on Ignition.		Number per cc.	Colon Present.
11513	4.	271.	52.5	.....	384	57	1.1	2	Not in 10 cc.
11514	4.	269.	50.0	.....	378	80	.25	2	Not in 10 cc.

*Source of Samples.**Number.*

11513. Tap at pumping station.

11514. Tap at Wm. Piper & Sons hardware store.

REPORT ON PROPOSED WATER SUPPLY FOR NEW CONCORD.

On August 12th, 1912, plans for proposed water supply for New Concord were received from Mr. F. H. Eno of Columbus, consulting engineer for The New Concord Real Estate Company. On May 7th, 1912, a preliminary inspection of the location proposed for the public water supply was made by one of the assistant engineers. On several occasions during 1909, 1910, 1911, and 1912, examinations were made regarding the proposed public water supply by representatives of the State Board of Health. Based upon an examination of the plans and knowledge secured during previous visits, the following report was submitted:

New Concord is a village with a population of about 700, located on the north branch of Crooked Creek in the extreme easterly portion of Muskingum County. The population of the village is increased during a portion of the year by the enrollment of Muskingum College, which amounts to about 300. There are no municipal improvements, with the exception of the installation of an electric lighting plant.

The topography of the village and surrounding country is hilly. The underlying geological formations are shales and the surface deposits are clayey in nature, resulting from the weathering of the native rock. Within the village on the north branch of Crooked Creek the deposits placed by stream erosion have a thickness of from 15 to 25 feet. Water is encountered in these deposits in fair quantities, although it is almost totally lacking in the drift deposits of the village.

RESUME OF INVESTIGATIONS OF PROPOSED WATER SUPPLY.

In 1909 The New Concord Real Estate Company was formed to place on sale an addition to the village. It was desired by the company to install a public water supply for the addition, and with this in view steps were taken to locate a suitable source of supply. Until recently the company has made its investigations without the aid of a consulting engineer, but upon securing a franchise to supply the entire village, the company retained the services of an engineer to design the proposed water supply.

The early investigations of the company to secure a source of water supply comprised the examination of the territory lying a short distance northwest of the village in a depression between two hills. This site was examined by a representative of the engineering department in August, 1909, and informally approved. Later, two springs near this site were suggested as possible sources by the company, but these failed to produce a sufficient amount of water to admit of consideration. A dug well, 12 feet in diameter and 45 feet deep, was excavated to the shale formations but encountered no water. Also a drilled well was sunk on this site to a depth of 234 feet, but furnished no appreciable quantity of water.

Following the failure to secure water at this point the company proceeded to investigate the availability of water in the valley of the north branch of Crooked Creek above the village. Wells were drilled to depths of 47, 87, 142 and 245 feet, located in the valley of the stream, a short distance west of the westerly corporation line. In all, three test wells were drilled and one unused gas well plugged. Two of the test wells and the plugged gas well were tested for yield. The results of these investigations showed that an insufficient supply of water was available and that the water obtained was of objectionable quality due to its mineral characteristics. While tests of the wells were being made, representatives of the State Board of Health made frequent visits to New Concord and assisted in the investigations.

Owing to the failure to secure a deep seated water supply, either at the site north of the village or in the valley of the north branch of Crooked Creek, it became necessary to develop either a shallow sub-surface supply or a surface supply.

PROPOSED WATER SUPPLY.

The plans of the consulting engineer provide for the installation of a water supply to be obtained from an infiltration gallery furnished through a distribution system provided with a reservoir for storage and equalization of pressure.

Source of Supply. For waterworks purposes The New Concord Real Estate Company has purchased about five acres of land in the valley

of the north branch of Crooked Creek, just within the westerly corporation line of the village. The tract lies upon both sides of the stream, that to the north being intended for the location of the pumping station, and that to the south for the proposed source of supply. The supply will be obtained by an infiltration gallery extending in a southerly direction, from the north branch of Crooked Creek, some 500 feet. At this point the valley of the stream narrows considerably so that the infiltration gallery practically extends across it. As regards the proximity of polluting influences the proposed location is satisfactory. No dwellings are within 1,000 feet of the proposed infiltration gallery and there are no other visible sources of contamination. The watershed of the stream above the infiltration gallery is 7.8 miles in area and is populated entirely by scattered farm houses. The topography of the watershed is hilly and there is consequently a rapid run-off of the precipitation. The consulting engineer, however, estimates that the percolation will be sufficient to provide an adequate water supply at the point selected for the location of the gallery. He estimates that the subsoil flow at the point will be 525 gallons per minute. Immediately west of the proposed location, the valley of the stream widens considerably and forms a natural storage reservoir, which the consulting engineer estimates should contain 60 to 80 days' supply.

The infiltration gallery is to be placed in an excavation about 15 feet deep, at which point shale is encountered. A 12-inch vitrified pipe line will be laid upon the shale and surrounded and covered to a depth of 5 feet with clean coarse gravel and sand. The formations penetrated in sinking the trench for this line were as follows:

- 3½ feet of clay and soil.
- 3 feet of clay with limestone chips intermixed.
- 5 feet of gravel, waterbearing.
- 3 feet of blue clay underlaid by shale.

Pump Well. The infiltration gallery ends in a manhole immediately south of Crooked Creek and a 12-inch cast iron pipe will lead from this manhole under the stream to the pump well. The design provides for the installation of a pump well excavated to a depth of 29 feet 6 inches. The pump well is circular in plan, with a capacity of 5,300 gallons per foot depth, 30 feet in diameter, and may fill to a depth of 8½ feet or more. The pipe from the infiltration gallery enters the pump well, 8½ feet above its bottom. The bottom of the well will be constructed of concrete, while the walls will be of impervious brick. The well will be covered by a conical wooden roof surfaced with paroid.

Pumping Station and Machinery. The proposed pumping station will be located adjacent to the pump well. It is to be a neat concrete building 55 by 44 feet in plan, which will contain a steam power plant for the operation of the pumps and electrical machinery to be installed

in the future. The pumps will be of the rotary type placed in a pit, the bottom of which is at an elevation of 22 feet above the bottom of the pump well. The elevation of the pumps themselves will permit of almost complete emptying of the pump well.

Distribution System. The distribution system will consist of 2.8 miles of wood pipe comprising the following sizes:

4-inch	1,740 feet
6-inch	10,120
8-inch	3,240

The distribution system will make the supply available in practically all portions of the village.

Distributing Reservoir. The distributing reservoir is to be placed on a hill situated southwest of the village. The elevation of the reservoir when full will be about 100 feet above the highest portion of the village. The reservoir is circular in plan, 46 feet in diameter, and 12 feet in depth to the overflow. Its capacity is, therefore, 150,000 gallons. The bottom of the reservoir will be constructed of concrete and the walls will be of impervious brick. A core wall of reinforced concrete in the circular brick wall will provide strength and watertightness. The reservoir will be covered with a conical wooden roof surfaced with paroid.

Quantity of Proposed Supply. No adequate tests of the available yield of the supply have been made. Partial tests have indicated that the supply is sufficient for the present needs of the village. After 315 feet of the infiltration line had been installed, a yield of 45 to 60 gallons per minute was recorded. This would indicate that the completion of the infiltration line will provide 75 gallons or more per minute.

Quality of Proposed Supply. Samples to indicate the quality of the water obtained from the shallow deposits of the valley of the north branch of Crooked Creek were taken on May 7th, 1912, from a dug test well. The analytical results show the water to be satisfactory from a sanitary standpoint. The water is high in iron, but the presence of this constituent may be accounted for largely by the newness of the well and an unsuitable method of pumping. The iron may be reduced by pumping.

SUMMARY.

From the foregoing report it will be seen that for several years The New Concord Real Estate Company has made a search for a suitable water supply for New Concord. Extensive investigations have demonstrated the difficulty of securing water from deep wells and it is necessary to depend upon the shallow subsurface water or a surface supply. The development of a shallow subsoil supply according to the plans of the consulting engineer, should provide a water supply safe for domestic use. The various features of the development, including the

infiltration gallery, pump well, distribution system, and distributing reservoir, are of such a design that the supply should suffer no deterioration by its method of handling.

The quantity of water available has been insufficiently determined and it may be noted that it is impossible to accurately state what quantity will be available until the source has been completely developed.

ACTION OF THE BOARD.

At a meeting held August 15th, 1912, the State Board of Health approved the plans for a proposed water supply for New Concord, submitted by Mr. F. H. Eno, of Columbus, consulting engineer for The New Concord Real Estate Company, on August 12th, 1912, subject to the following conditions:

1st. That as soon as possible after the development of the source of supply, a comprehensive test be conducted to determine the quality and available quantity of the proposed supply, and that the State Board of Health be informed in advance of the time and manner of conducting such test; (Test conducted Nov. 20th to 26th, 1912.)

2nd. That if at any time in the future the quality or available quantity of the supply, in the opinion of the State Board of Health, shall have deteriorated, a new source of supply satisfactory to the State Board of Health shall be installed;

3rd. That a process for iron removal, satisfactory to the State Board of Health, be installed when deemed necessary by said Board;

4th. That the council of the village pass an ordinance preventing the establishment of any privy vault, cesspool, or other source of pollution, within 1,000 feet of the source of supply in a northerly, southerly, or westerly direction, and within 500 feet of the source in an easterly direction; and

5th. That this approval be void unless the proposed supply shall have been installed prior to September 1st, 1913.

The company was informed that the Board was not assured of the availability of a sufficient quantity from the proposed source of water supply and that past experience had demonstrated the difficulty of obtaining a permanent supply by infiltration lines or galleries.

EXAMINATION OF WATER FROM NEW CONCORD.

PARTS PER MILLION.

Sample Number.	Collected.	Color.	Turbidity.	Sediment.	Odor.	Oxygen Required.	Nitrogen as			
							Albuminoid Ammonia.	Free Ammonia.	Nitrites.	Nitrates.
11364	1912. May 7....	5	17	dist.	none	.35	.010	.098	0	.6
11365	May 7....	6	130	heavy	sl. musty	2.67	.018	.120	0	.3

Sample Number.	Chlorine.	Alkalinity.	Incrustants.	Sulphates.	Residue on Evaporation.		Iron.	Bacteria.	
					Total.	Loss on Ignition.		Number per cc.	Colon Present.
11364	3.	178	none	.....	241	8	2.8	50	Not in 10 cc.
11365	3.	194	none	.....	496	28	16.0	200	Not in 10 cc.

*Source of Samples.**Number.*

11364. Dug well No. 9. Sample collected at 3 P. M.

11365. Dug well No. 9. Sample collected at 5 P. M.

REPORT ON PROPOSED WATER SUPPLY FOR NEW LEXINGTON.

On March 27th, 1911, Mr. J. R. Tanner of Zanesville, engineer for New Lexington, submitted plans for a proposed water supply for the village. On June 1st and December 28th, 1911, one of the engineering assistants visited New Lexington and the following report was submitted:

New Lexington is a village of 2,600 population, located in Perry County on the watershed of the Hocking River. The village is of some manufacturing importance, having a large foundry and several clay industries. Its growth during the past decade has been flourishing and will probably continue in the future. The topography of the village and surrounding country is quite hilly. Two small streams which receive the drainage from the village, join in the northwesterly portion,

and the growing section of the village is situated on the low land near their confluence. The older portion of the village is on the higher ground. The geological formations in the vicinity consist of a capping of clay of a varying depth, under which are alternating strata of shale, clay, and limestone to a depth of 275 feet, where the "Big Injun" sand rock is encountered. This rock is penetrated by oil wells and has been found to have a thickness of 250 feet.

In municipal improvements the village has made but slight advancement. There are no sanitary sewers, although several storm sewers have been installed. The movement for a public water supply was started in the early part of 1910, and in 1911 the village council contracted with a private company for the installation of the supply, the village to lease or purchase the same at some future date.

PROPOSED PUBLIC SUPPLY.

The plans of the consulting engineer for the development of a public water supply provide for the drilling of several wells from which the water is to be pumped by air lift and stored in a concrete collecting basin and pump well, from which it will be delivered to the distribution system by a service pump.

Site. The site selected for the location of the supply wells is situated about $\frac{3}{4}$ mile southeast of the center of the village and immediately outside the corporation line. The site has an area of six acres and lies a short distance northeast of the T. & O C. Railroad. The surface conditions in the vicinity of the site are at present satisfactory. The nearest houses lie at a distance of 1,000 feet to the north, and the future building development in the vicinity will probably be slight, owing to the hilliness of the land. Immediately north of the site is a tract of about ten acres owned by the Perry County Children's Home. This tract contains no buildings at present. Drainage from future buildings could be conducted away from the site in a northerly direction. A private park has been developed on a tract adjoining the site on the west. The park contains a concrete swimming pool, and a loosely constructed privy; the latter being located but a few feet from the westerly line of the water works site. The presence of this park may affect the quality of the proposed supply, and it will be necessary that the existing privy be abandoned.

Test Wells. Test well No. 1 was drilled in the early part of 1910 and was sampled by a representative of the engineering department on May 2nd, 1910. This well is 270 feet deep. Three waterbearing strata were encountered at depths of 50 feet, 110 feet, and about 270 feet, respectively. The upper two strata were cased off and the supply obtained entirely from the lowest waterbearing horizon. Before pumping the water stood at 40 feet from the surface, but was lowered by

pumping, at the rate of 40 gallons per minute, to 125 feet, where it remained.

Well No. 2 is located about 210 feet north of well No. 1 and is 8 inches in diameter. It has a total depth of 278 feet and, as originally drilled, obtains its water supply from the three strata above described. A log of this well was kept in drilling and it is as follows:

<i>Material.</i>	<i>Thickness.</i>	<i>Depth.</i>
Surface soil	20 feet	20 feet
Shale	20	40
Clay mixed with fine sand (waterbearing).....	20	60
Shale	40	100
Hard limestone (waterbearing).....	15	115
Shale	10	125
Fine white sand.....	25	150
Shale	30	180
Limestone	12	192
Shale	26	218
Shale mixed with fine sand.....	47	275
Big Injun sand rock (waterbearing).....	To bottom of well	

Total depth of well..... 278 feet

A test of this well was made, and by pumping at the rate of 50 gallons per minute the water was lowered from its normal stage of 30 feet from the surface to about 120 feet, where it remained. The level of water in well No. 1 was lowered only 4 feet by this pumping, and at the end of the test on well No. 2 the water in well No. 1 was but 6 feet below normal. This indicates a somewhat indirect connection between the wells. A sample was collected from well No. 2 and its analysis showed a high chlorine content. The State Board of Health advised that the two upper waterbearing strata be cased off. This advice was carried out so that the well at present obtains its supply only from the lowest horizon. Recently a third well has been drilled on the site, extending to a depth of about 285 feet and obtaining its water from the "Big Injun" sand rock.

Development of the Supply. The plans for the development of the supply provide that the wells be cased to a depth of 110 feet or more, and that they be pumped by air lift apparatus of an approved type. The tops of the wells will be tightly closed to prevent surface contamination and the water will be conducted through closed iron pipes to the collecting basin and pump well which is to be located at the pumping station. This collecting basin is to be 20 feet in diameter by 12 feet deep, with a capacity of 25,000 gallons. It is to be constructed of concrete and placed in excavation and covered with a conical wooden roof. The water will be pumped from the collecting basin into the distribution system by a horizontal duplex steam pump of 300 gallons per minute capacity. The distribution system, to be constructed at present, is to consist of about

5 miles of pipe varying from 4 inches to 10 inches in diameter. For equalization and storage an elevated tank of 60,000 gallons capacity is to be provided.

Quality of Water. Samples from test wells for the public water supply have been collected on May 2nd, 1910, June 1st, and June 30th, 1911. A sample collected on May 2nd, 1910, was taken from test well No. 1 after a pumping test, and its analysis indicates a water of satisfactory quality in regard to its chemical constituents, although its bacterial content is high. This may be attributed to the newness of the well and to the crudeness of the pumping machinery. Test well No. 2 was sampled on June 1st, 1911, after a 48-hour pumping test, and from a sanitary standpoint the quality of the water was satisfactory, although its bacterial content was somewhat higher than is desirable. Its abnormal chlorine content, however, imparted to the water a saline taste and rendered it objectionable. Test wells Nos. 2 and 3 were sampled on June 30th, these samples being collected by one of the local officials. Previous to the collection of these samples, the casing in well No. 2 was lowered so that the supply was entirely drawn from the "Big Injun" sand rock. The analyses of the samples indicate a water of satisfactory quality, judging from its chemical constituents. No bacterial samples were collected at this time. The only objectionable constituent in these samples is the high iron content, but in view of the previous analyses it does not seem likely that this iron content will appear after continuous pumping.

As a whole, the analyses indicate that the water supply is of satisfactory sanitary quality. Furthermore, owing to the great depth from which it is drawn and to the length of the casing, the quality should suffer no deterioration if reasonable precaution is taken to prevent the encroachment of dwellings in the neighborhood of the wells.

Quantity of Water Available. It should be noted that although the specifications of the engineer provide for a suitable pumping test to determine the capacity of each well, no extensive test has been made and only crude well drilling machinery has been used to pump the wells. A maximum of 50 gallons per minute from each well has thus been obtained, although with suitable machinery the wells may yield a quantity in excess of this amount. The maximum yield of the waterbearing stratum, therefore, is not known. It appears, however, that the area of land secured by the village is sufficient to afford an opportunity for drilling wells to meet the water consumption demanded by the village.

ACTION OF THE BOARD.

At a meeting of the State Board of Health held December 20th, 1911, the acting chief engineer made a verbal report on the water supply proposed for New Lexington as outlined in plans prepared by Mr. Wm. McCoy of Zanesville, and submitted March 27th, 1911, and he was in-

structed to present a complete report for action by the Board at its next meeting. The authorities were notified that the Board would not object to their proceeding with the work then under way.

At the meeting held January 17th, 1912, the water supply to be obtained from drilled wells located on a site about three-fourths of a mile southeast of the center of the village and to be developed according to plans submitted by Mr. J. R. Tanner, consulting engineer, on March 27th, 1911, was approved upon the following conditions:

1st. That a process for the removal of the excessive iron content be installed to improve the quality of the water;

2nd. That the village council by ordinance cause to be removed all privies, cesspools and other sources of pollution at present located within 500 feet of the waterworks property, said ordinance to provide that when privy vaults or cesspools are abandoned they shall be thoroughly cleaned and disinfected before being filled with clean earth or ashes; and prevent future location of sources of pollution within this distance, said ordinance to be submitted to the Secretary of the State Board of Health for approval before its passage; and,

3rd. That before final acceptance by the village of the water supply an adequate pumping test be made on all the wells to determine their available yield, and that the State Board of Health be notified in advance of the time of such test.

EXAMINATION OF WATER FROM NEW LEXINGTON.

PARTS PER MILLION.

Sample Number.	Collected.	Color.	Turbidity.	Sediment.	Odor.	Oxygen Required.	Nitrogen as			
							Albuminoid Ammonia.	Free Ammonia.	Nitrites.	Nitrates.
9424	1910 May 2	3	5	trace	none	0.70	.012	.540	none	none
10335	1911 June 1	7	11	v. slight	none	0.55	.026	1.498	none	.2
10421	July 1	8	34	distinct	sl musty	1.5	.036	.106	0	.2
10422	July 1	8	24	decided	none	1.1	.056	.190	trace	.4

Sample Number.	Residue on Evaporation.							Bacteria.	
	Chlorine.	Alkalinity.	Incrustants.	Sulphates.	Total.	Loss on Ignition.	Iron.	Number per cc.	Colon Present.
9424	19.5	440	none	.....	529	20	0.9	3600	Neg. in 10 cc.
10335	637.5	204	none	.....	1216	154	0.2	600	Neg. in 10 cc.
10421	4.	68	10.	.....	228	23	3.9	No	bacterial sample.
10422	4.5	96	10.	.....	290	62	7.8	No	bacterial sample.

Source of Samples.

Number.

9424. Test well No. 1. Drilled well east of village. Total depth 376 feet through sandstone, shale and slate.
 10335. Test well No. 2. Sample collected from end of discharge pipe.
 10421. Test well No. 2. Sample collected by local officials.
 10422. Test well No. 3. Sample collected by local officials.

Sample No. 9424 was collected by Mr. R. W. Ferris.

Sample No. 10335 was collected by Mr. R. F. MacDowell.

REPORT ON PROPOSED DEFERRIZATION PLANT FOR OAK HARBOR.

At a meeting held October 18th, 1911, the State Board of Health considered a proposed water works site for Oak Harbor, bounded by Walnut Street, Park Street, Church Street, and the Wheeling and Lake Erie Railroad, as shown on plans submitted by the board of trustees of public affairs on August 4th, 1911; and also the use of the two wells which had been recently sunk on said site. The site, and the use of these wells was approved, provided:

1st. That no additional wells be installed without first obtaining the approval of the State Board of Health; and,

2nd. That an iron removal plant of a design satisfactory to the State Board of Health be included in the new water works, and that same be used to remove the objectionable excess of iron which is present in the water.

In compliance with the second condition of approval Mr. George Champe, consulting engineer for the village, submitted plans on January 18th, 1912, for a deferrization plant. The plans were examined by the acting chief engineer and the following report submitted:

Analyses of samples of water from drilled wells at Oak Harbor, made in the Board's laboratory, show an average iron content of 2.4

parts per million. This, while not excessive, is sufficient to impart to the water an objectionable appearance and to cause the staining of plumbing fixtures and fabrics. To render the water satisfactory, it is necessary to provide for the removal of at least 90 per cent. of this iron.

The plans for the development of the supply, which were submitted August 4th, 1911, and conditionally approved by the Board on October 18th, 1911, included a circular concrete covered collecting reservoir of 225,000 gallons capacity to receive the water pumped from the wells. In providing for an iron removal plant the engineer has modified the design of this collecting reservoir by including in it an aerator and using the collecting reservoir as a sedimentation basin.

The plant designed for the removal of the iron from the water consists of an aerating device and a sedimentation basin. The discharge line from the wells is brought through the bottom of the collecting reservoir and extends to within a few feet of the roof, where the water is discharged some 10 feet above the overflow line of the reservoir. The aerating device is attached to and supported by this discharge pipe. The aerator consists of three horizontal circular steel plates with diameters of 5 feet, 6 feet, and 7 feet, surrounding and riveted to the pipe. The uppermost plate, which is the smallest, is placed one foot below the end of the discharge pipe; the second, or 6-foot plate, is 3 feet lower; while the largest plate is 3 feet below the second plate and 3 feet above the overflow line. The plates are perforated with $\frac{1}{4}$ -inch holes spaced one inch on centers. In operation the water from the discharge pipe will percolate through the holes in the plates successively, by which means will be provided for the absorption of oxygen. Sedimentation will take place in the basin below and the supply will be drawn off from the bottom of the basin near the outside wall. The sedimentation basin provides a storage of about two days' consumption.

The deferrization plant as a whole should give satisfactory results during the early part of its operation, but it appears inevitable that the perforations in the plates will become clogged with deposition of ferric oxide, and this clogging will defeat the purpose of the device. The aerator is, moreover, somewhat inaccessible for cleaning and it will be very difficult to keep the plates in proper working condition.

A plant of this description was installed by Mr. George Champe for the waterworks at Leipsic about six months ago. This installation was made without the knowledge or approval of the State Board of Health and has only recently been examined by a representative of the engineering department. Samples of the water from the wells and from the sedimentation basin were collected and the analyses indicate a reduction in iron from 1.0 to 0.3 parts per million. This indicates efficient aeration and sedimentation accompanied by satisfactory removal of the iron. It was noted, however, at the Leipsic plant that the plates, after continuous operation of about six months, are rapidly becoming coated and clogged

with the characteristic red iron deposits, and it is evident that they will eventually be put out of service by this incrustation. This evidence would indicate that an iron removal plant of this design is not to be considered permanently effective.

ACTION OF THE BOARD.

At a meeting held February 15th, 1912, the State Board of Health withheld its approval of these plans for a deferrization plant for Oak Harbor, submitted by Mr. George Champe, consulting engineer, January 18th, 1912, in compliance with the second condition of the Board's approval of a water supply for that village, and advised that an aerating device of more satisfactory design should be provided to insure a permanent efficiency of aeration.

REPORT ON PROPOSED IMPROVEMENT OF WATER SOFTENING PLANT AT OBERLIN.

On June 11th, 1912, Mr. A. Elliott Kimberly, consulting engineer for the village of Oberlin, submitted plans and specifications for a proposed improvement in the water softening plant at that village. A knowledge of the local conditions has been gained by previous visits, and based on this and a review of the plans and specifications, the following report was submitted:

Oberlin is a village with a population of 4,365 in 1910, located in the north-central part of Lorain County on the watershed area of the Black River. A public water supply was installed in 1887, being obtained from the east branch of the Vermilion River near Kipton a few miles west of Oberlin. The water was conveyed by gravity to a reservoir of 15,000,000 gallons capacity, located within the village.

In 1903 the village installed a water softening plant to improve the quality of the water supply. Since the installation of this improvement no important changes have taken place in the method of obtaining the supply. Certain details of the water softening plant as it exists make it impossible to produce a satisfactory water at all times, and it has become necessary to provide rather extensive changes and replacements. Before describing the proposed improvements, a brief description will be given of the existing supply.

PRESENT WATER SUPPLY.

The water supply, obtained from the east branch of the Vermilion River near Kipton, is conveyed through a vitrified pipe conduit about $5\frac{1}{2}$ miles to a storage reservoir, from which it flows through the softening plant and is pumped into the distribution system. The conduit is laid in wet ground in many places and is in a rather leaky condition, and

the supply, therefore, consists of a mixture of river water and ground water. Normally the water is excessively hard for a surface water; hence the necessity of its treatment. The storage reservoir is constructed in excavation and embankment, covers an area of 4 acres, and has an average depth of about $17\frac{1}{2}$ feet. Its capacity is approximately 15,000,000 gallons. The bottom of the reservoir is clay but the sides are paved with riprap. The reservoir has given some trouble owing to the occasional growth of algae which impart tastes and odors to the water. The water is taken from the reservoir through a floating outtake which draws the settled water at a depth of 1 foot from the surface. The water passes through a mixing box where the softening chemicals are applied, and enters the settling basins where coagulation and softening take place. The settling basins are open reservoirs, semi-elliptical in shape, separated by a concrete wall. The bottoms of the reservoirs are paved with one course of brick. The basins have a capacity of 287,000 and 300,000 gallons, respectively. They are not provided with baffles and therefore the distribution of flow is very imperfect. Connection between the basins is by means of a 12 inch pipe through the concrete wall at an elevation one foot below the normal flow line. The softened water is drawn from the second basin through a floating outtake pipe.

The softened water flows into a circular pump well 31 feet 4 inches in diameter by 19 feet deep, from which it is pumped into an elevated standpipe of 66,000 gallons capacity. From this tank the water flows directly through two pressure filters, designed to remove the precipitates remaining in the water. The effluent from the pressure filters is directly connected to the distribution system supplying the village.

The State Board of Health made extensive examinations of the water softening plant at Oberlin during 1906 and 1907, and the results of these examinations indicated that the plant should be altered to produce uniformly good results. In brief, the criticisms referred first to the indeterminate quantity of raw water treated; second, insufficient facilities for reaction after the softening chemicals were applied; third, inefficient sedimentation caused by the improper design of the sedimentation basins; and fourth, lack of facilities for frequent removal of sludge and for its proper disposal. The lack of proper facilities to accomplish the best results has created conditions in the plant which require repairs. The pressure filters, which act as a final process, have given considerable trouble owing to deposits or incrustations which have almost completely clogged the filtering medium. This has been brought about by the inefficiency of the preliminary processes and has resulted not only in a fluctuating pressure on the distribution system but also in causing after-deposits in the mains.

PROPOSED IMPROVEMENTS.

In connection with the essential improvements, which are to be made, it is the intention to include a number of minor repairs and replace-

ments which will establish the plant in proper working condition. The main features of the reconstruction of the plant include the following:

1st. Proper facilities for controlling the flow of raw water from the storage reservoir to the softening plant.

2nd. Improved facilities for applying the softening chemicals.

3rd. Facilities for thoroughly mixing the treated water and completing the reactions.

4th. Improved sedimentation by baffling the existing sedimentation basins.

5th. Facilities for rapid and frequent removal of sludge and for its proper disposal.

6th. Construction of gravity filters for clarifying the softened water.

Outtake Pipe and Control Chamber. The new outtake pipe will convey the water from the storage reservoir to a control chamber in which the quantity of flow will be regulated. The pipe will be spiral riveted steel, 12 inches in diameter, and will be attached to the existing floating outtake. When the stage of the reservoir becomes too low to admit of gravity flow, a small centrifugal pump to be installed, will lift the water to the gravity line. The control chamber is a covered concrete box and will contain a Simplex rate controller with a rated maximum capacity of 750,000 gallons per 24 hours. When once adjusted it will deliver a constant quantity of water regardless of the pressure on the upstream side. Within the control chamber, immediately beyond the rate controller, the water is discharged into a chamber where the lime solution is applied through a 4-inch pipe. A few feet beyond in a channel leading to the reaction channel, the soda ash is applied through a 2-inch pipe.

Reaction Channels. The treated water will flow through a covered channel a distance of about 12 feet from the control chamber to the main reaction channels where the softening reactions are completed. This channel is to be constructed around the top wall of the sedimentation basins and is to provide means for thorough mixing and reaction before the water is allowed to undergo subsidence. The treated water flows in two directions from the control chamber channel to the opposite side of the subsidence basins where it discharges. The main reaction channels are 18 inches wide and provide for velocities of 0.25 feet and 0.35 feet per second, respectively. The reaction periods are 14.1 and 10.6 minutes, respectively. The channels are baffled the first 30 feet of their length to provide complete mixing. In comparison to the velocities and periods provided, the Columbus design gives 0.37 feet per second and one hour, respectively. Inasmuch as the subsidence basins at Oberlin provide a period of 8 hours operating at 750,000 gallons per day, they will furnish ample opportunity for the completion of the reactions.

Subsidence Basins. The existing subsidence basins are to be improved by adding baffles to distribute the flow, and sludge piping to admit of frequent removal of the sludge. The baffles divide the basins into approximately equal sections so that a fairly constant velocity of flow will be maintained, and thus the maximum effect of sedimentation produced. The basin which will first receive the treated water will be provided with three baffles, the second basin will have two baffles and the approximate length of flow in each basin will be 220 feet. The greater sludge deposit will occur in the first basin and in order to provide means for easy and frequent removal, an extensive system of sludge piping is to be provided. In the second basin no sludge piping will be installed and the basin will be cleaned when necessary by draining through a sump as is done at present. The piping, which covers the bottom of each of the four compartments formed by the baffles, consists of 3-inch pipes drilled with $\frac{3}{4}$ -inch holes and connected to 6-inch mains discharging into an 8-inch header leading to the sewer. The number of $\frac{3}{4}$ -inch holes is such that the total area is somewhat less than that of the section of the 8-inch pipe, and thus there will be a tendency toward uniform flow through the openings. This system of sludge removal makes possible the cleaning of a basin without throwing it out of service and it is designed to operate the sludge removal device at Oberlin once each day. The system has been in successful operation in a number of small industrial softening plants and has also been used with success at Owensboro, Kentucky, and McKeesport, Pa. The sludge will be discharged into Plum Creek during high stages and provision for its storage during low stages is to be provided by constructing a basin.

The outlet from the sedimentation basins will be through a floating outtake leading to the filter control.

Filter Control and Filters. In the operation of the plant the water level in the sedimentation basins may fluctuate 15 inches, and therefore the head on the filters will fluctuate undesirably. The controller will make the operating head of the filters constant, which is important to the proper operation of the filters of the type to be installed. In the construction of the filters the existing pump well is to be covered and housed and converted into a clear well. The filters will be placed immediately over the well. The design of the filters provides for the construction of six concrete compartments arranged in a hexagon. Four will be constructed immediately. Wood fiber or excelsior is to be employed to clarify the settled water. Seasoned poplar is to be employed and all resinous wood excluded. A sample of the poplar excelsior proposed for use has been submitted and is satisfactory. The compartments will each contain excelsior sufficient to provide 1.27 cubic feet per 1,000 gallons when operated at a rate of 125,000 gallons per day. The bottoms of the compartments are so arranged that the settled water will pass through a thickness of 3.25 feet at the inlet and 2.75 feet at the outlet. The flow will take

place almost horizontally through the filtering material and the inlet and outlet is to be provided with shear gates to control the flow. The effluent will pass over a broad-crested weir into the clear well.

Wood fiber as a filtering material has been used in water softening plants in various part of the country and with considerable success. It has been employed frequently in railroad and other industrial plants but has not been employed in municipal plants until recent years. The Owensboro, Kentucky, plant has used an excelsior filter for a year or more with success. The choice of the quality of excelsior is important as it is necessary to obtain well-seasoned and non-resinous wood. Pine is excluded but poplar is generally satisfactory. In any case thorough soaking of the material to remove soluble matter, is required. Inasmuch as there is no question relating to the sanitary quality of the Oberlin water supply, the choice of the filtering material should be entirely dependent upon its ability to brighten the water. Although wood fibre will admit of washing, it will be necessary to renew the material frequently, perhaps once each month.

Application of Softening Chemicals. In order to provide for constancy in the rate of application of the softening chemicals, improvements are to be made in the apparatus for introducing the lime and soda ash. After slacking, the quicklime will be placed in a dissolving tank provided with mechanical agitators. The milk of lime will be stored in a solution tank with a capacity to provide ten hours' treatment. The solution will be maintained at constant strength, 700 grains CaO per gallon. It will be pumped to a constant head overflow orifice box and applied to the water as described.

The soda ash will also be applied through a constant head orifice box, being introduced into the water shortly after the lime is applied.

Provision may also be made for treatment with hypochlorite, such treatment to provide safety of the supply in emergency.

ACTION OF THE BOARD.

At a meeting held June 19th, 1912, the State Board of Health considered the proposed improvement of the water softening plant at Oberlin, as shown on plans and specifications submitted by A. Elliott Kimberly, consulting engineer, on June 11th, 1912, and approved the same subject to the following conditions:

1st. That in case the wood fiber filters fail to produce satisfactory filtration, filters of other material be substituted;

2nd. That the reaction channels be lengthened unless the operation of the improved plant demonstrates their adequacy; and

3rd. That this approval be void unless the proposed improvements shall have been made prior to July 1st, 1913.

REPORT ON PROPOSED WATER SUPPLY FOR PAYNE.

On October 11th, 1912, a communication was received from Mr. J. W. Venrick, mayor of Payne, requesting approval of the proposed water supply for the village to be used for fire protection purposes. On August 28th, 1912, detailed plans for the proposed supply were submitted by Mr. Charles Brossmann, of Indianapolis, Indiana, consulting engineer for the village. On September 27th, 1912, one of the assistant engineers visited Payne and conferred with the mayor regarding the proposed supply. The following report was submitted:

Payne is a village with a population of 1,027 in 1910, located in Paulding County. The topography of the village and surrounding country is flat and the drainage is slowly carried to Flat Rock Creek, a tributary of the Auglaize River. The geological formations are those characteristic of the north-westerly section of the state. The drift has an average thickness of about 45 feet and consists of clayey stratum. It contains practically no water. It is underlaid by limestone formations from which water is obtained in relatively large quantities.

The village is primarily a farming center and has no industries. No municipal improvements aside from an electric light plant have been provided.

Past Actions of the State Board of Health. In September, 1911, the State Board of Health considered a proposed site for public water supply wells for Payne adjacent to the existing electric light plant. The Board voted to disapprove this site and advised that the wells be located outside the built-up portion of the village. At a meeting held October 18th, 1911, this action was reaffirmed after reconsideration by the Board.

In August, 1912, it was learned that contracts had been awarded for the installation of a water supply and in correspondence with the mayor, it was ascertained that it was proposed to install the supply at the disapproved site but to restrict its use to fire protection and permit no connections for domestic purposes.

PROPOSED WATER SUPPLY.

The plans of the consulting engineer provide for the development of a water supply derived from wells located upon a site adjacent to the electric light plant, previously disapproved by the Board. Owing to the lack of funds it is at present impossible to install a supply for general purposes at a satisfactory location, and it is, therefore, intended to provide a temporary supply for fire protection only. The development will, however, include as permanent features, pumping equipment, a complete distribution system, and an elevated tank for storage.

Site. The proposed location of the wells is near the central portion of the village immediately north of the right of way of the New

York Central & St. Louis Railroad. Within a radius of 500 feet there are sixteen dwellings which are accompanied by barns, sheds, pig pens, chicken yards, and privies. Several of these are within a radius of 150 feet. It has been stated by the local officials that steps will be taken to remove the polluting influences, but this is obviously impossible. The unsanitary conditions surrounding the site create a menace to the supply and its pollution may easily occur as a result of a defective or loose fitting casing.

Wells. At the present time a well 287 feet deep is to be used as a source of supply. This well has been used for a year or more to supply boiler feed water at the lighting plant. The well is cased to a depth of about 40 feet with 6-inch casing. The formations penetrated by the well are approximately 40 feet of clay and 247 feet of limestone.

Development of Supply. The well or wells, if more than one are used, will be pumped by air lift discharging into a collecting reservoir. The tops of the wells will be protected by a concrete cistern covered with a wooden superstructure. The collecting reservoir is of reinforced concrete construction and is covered with a concrete roof. It is 12 feet by 20 feet in plan and 10 feet in depth. Its capacity is 18,000 gallons. An electrically driven centrifugal pump of 300 gallons per minute capacity takes its suction from the collecting reservoir and discharges into the distribution system and elevated tank.

Quality of Water. Samples of the proposed supply were collected by one of the assistant engineers on August 29th, 1911. The analyses indicate that the water is of satisfactory quality as regards sanitary characteristics, and there is no evidence of organic pollution. The water is, however, high in mineral content, especially as regards its hardness. The quality of the supply may remain good indefinitely but the unfavorable surroundings should be taken as a menace, and there is constantly the danger that the supply may become contaminated.

Available Locations. Within a short distance of the village in almost any direction a suitable location as regards surface conditions may be secured at a small cost. While the development of one of these locations may be impossible at the present time, it should be provided by the Board that a suitable site be secured before the supply is furnished for domestic purposes.

ACTION OF THE BOARD.

At a meeting held October 23rd, 1912, the State Board of Health approved the proposed water supply for Payne, to be used for fire protection only, to be derived from wells located upon a site adjacent to the electric light plant, subject to the following conditions:

- 1st. That the village council pass an ordinance preventing the use of the proposed water supply for domestic purposes by prohibiting the establishment of any service connections to the mains, unless such con-

nections shall be for purposes other than domestic use and shall have been approved by the Secretary of the State Board of Health; and that the said ordinance shall be submitted to the Secretary of the said Board for approval before its passage;

2nd. That a certified copy of the plan of the distribution system showing all connections to the mains for any purpose shall be submitted to the State Board of Health as soon as the system shall have been installed;

3rd. That prior to January 1st, 1915, the proposed supply for fire protection be abandoned and a water supply for general purposes be installed at a site satisfactory to the State Board of Health; and,

4th. That this approval shall be void unless the proposed supply for fire protection shall have been installed prior to January 1st, 1913.

REPORT ON WATER SUPPLY OF THE PENNSYLVANIA RAILROAD AT MANSFIELD.

On May 23rd, 1912, a communication was received from Mr. Louis D. Barr, secretary of the board of health of Mansfield, relative to the use of the effluent from the sewage purification plant at Mansfield by the Pennsylvania Railroad at its roundhouse. On May 28th, 1912, one of the assistant engineers visited Mansfield and examined this source of water supply. The following report was submitted:

The Pennsylvania Railroad round house at Mansfield is located along the right of way of the railroad in the southeasterly portion of the city, a short distance from the city sewage purification works. Until April 15th, 1912, the water supply of the round house for boiler and other use was obtained from flowing wells located on the railroad property and also from the municipal water supply. The hardness of this water rendered it objectionable, and during the past year the railroad entered into an agreement with the city whereby it obtained the effluent from the sewage purification plant, in return for cinders furnished the city to be used as filtering material. The effluent from the plant is conveyed by gravity to a pump well located near the round house from which it is pumped into the piping system.

The water supply thus obtained is employed for boiler use in the locomotives, and is also available and is used for washing purposes by the employees. It is probable that it is used to some extent for drinking as no attempt is made by the railroad company to inform the employees by signs or other warnings of the character of the water. A single tap is available which furnishes water from the municipal supply for drinking purposes, but this is located outside the building. Within the building there are 13 taps conveniently located for filling the water tanks

of the locomotives. The wash room, with eight stands, is supplied by the water obtained from the Mansfield sewage plant. Taps from the water tanks in the locomotive tenders also make the water available to the employes for washing and drinking purposes. It will be readily seen that the workmen are in serious danger of infection if permitted to use this water for washing purposes. If taken internally the water is almost certain to cause disease.

ACTION OF THE BOARD.

At a meeting held June 19th, 1912, the State Board of Health considered this report.

The Board declared the unfitness of the sewage effluent for water supply purposes and the danger of infection of the employes of the railroad company and others, resulting from its use; and the Secretary was instructed to notify the director of public service of Mansfield to cease furnishing the effluent from the sewage purification plant to the railroad company for any use.

Upon receipt of a notice of this action the railroad company asked the Board to recall its instructions to the city of Mansfield, stating that their operation would be seriously hampered. The director of public service also reported that their regular supply was short and asked to be permitted to continue furnishing the effluent of the sewage purification plant to the Pennsylvania Railroad.

ACTION OF THE BOARD.

At a special meeting of the State Board of Health held at Cleveland, June 28th, the question of modifying the action of the Board on June 19th, 1912, relative to the use of the effluent of the sewage purification plant at Mansfield by the Pennsylvania Railroad Company at its roundhouse was taken up and the Board voted to permit the use of this effluent for boiler and boiler washing purposes, provided:

(1) That the railroad company immediately install for drinking and washing purposes the city public water supply, or other water supply of suitable quality;

(2) That the railroad company make known, by suitable notice, the fact that the water received from the sewage purification plant is impure and dangerous to health; such notice to be posted wherever said water is available; and,

(3) That should the efforts of the railroad company result in failure to secure a sufficient amount of water for all purposes from additional wells, the railroad company will install some method of sterilization of the sewage effluent, the plans for such sterilization plant to be submitted to and approved by the State Board of Health.

Owing to the inadequacy of the present public water supply, the Board called the attention of the city officials to the necessity of supplementing the present supply, and suggested that as soon as possible a competent engineer be employed to study the water supply question.

EXAMINATION OF WATER FROM MANSFIELD.

PARTS PER MILLION.

Sample Number.	Collected.	Color.	Turbidity.	Sediment.	Odor.	Oxygen Required.	Nitrogen as			
							Albuminoid Ammonia.	Free Ammonia.	Nitrites.	Nitrates.
11412	1912 May 28	7	14	distinct	kerosene	3.07	.162	1.446	.013	1.0

Sample Number.	Chlorine.	Alkalinity.	Incrustants.	Sulphates.	Residue on Evaporation.		Iron.	Bacteria.	
					Total.	Loss on Ignition.		Number per cc.	Colon Present.
11412	40.	252.	77.5	.....	527.	53.	2.1	40,000	Pres. in 1 cc.

Source of Sample.

Number.

11412. Tap in boiler room at Penna. Railroad roundhouse.

REPORT ON PROPOSED WATER SUPPLY AND WATER PURIFICATION FOR THE MINING CAMP OF THE PROVIDENT COAL COMPANY NEAR FAIRPOINT.

On August 6th, 1912, one of the assistant engineers visited Fairpoint for the purpose of inspecting the proposed water supply for the mining camp of The Provident Coal Company near Fairpoint, revised plans for which were received from Messrs. George S. Baton & Company of Pittsburg, engineers for The Provident Coal Company, on August 5th, 1912. The following report was submitted:

The Provident Coal Company, which is controlled by Messrs. Pickands, Mather & Company of Cleveland, has recently opened a mine in

Belmont County on the Cleveland, Lorain & Wheeling Railway about one-half mile above Fairpoint. The mine, which enters the side hill, drains to Wheeling Creek. Owing to the recent opening of the mine, no permanent houses or buildings have been constructed. A contract has been let, however, for the construction of 50 miners' houses, to be located upon the hill back of the mine. It is estimated by the company that the ultimate population of the camp will be approximately 1000, and a water supply to accommodate that number of people is to be installed. The company owns about 80 acres of land and 25,000 acres of underground coal rights.

The country surrounding the mine is hilly, with a maximum difference in elevation between the hills and the valleys of approximately 200 feet. The geology of the region is comprised of alternate layers of coal, fire clay, shale, and sandstone, the formations being overlaid in both the hills and the valleys by a thin layer of drift. Investigations have demonstrated the absence of ground water in appreciable quantities.

Messrs. George S. Baton & Company have retained the William B. Scaife & Sons Company of Pittsburg, for the purpose of designing and installing a water supply which is to include a water purification plant.

PROPOSED WATER SUPPLY.

Several years ago, the Cleveland, Lorain & Wheeling Railway, which is now controlled by the Baltimore & Ohio Railroad, installed a small concrete dam for the purpose of impounding the waters of Wheeling Creek. The dam is located about $1\frac{1}{2}$ miles above the mine, at which point the watershed has an area of approximately 26.3 square miles. The impounding reservoir formed by the dam has an area of from $1\frac{1}{2}$ to 2 acres, and with the existing dam forms a storage basin having a capacity of approximately 6,500,000 gallons. The average rainfall for this district is 40 inches. Allowing a 30 per cent run-off, which would be equivalent to 12 inches, the annual yield of the watershed would be 5,500,000,000 gallons. The minimum rainfall during the past twenty-nine years was 26 inches. A run-off of 8 inches would be equivalent to 3,660,000,000 gallons. It will be readily seen, therefore, that it is possible to obtain a sufficient quantity of water from the watershed to supply the demands of the mining camp. It is true, however, that the storage capacity of 6,500,000 gallons is probably not sufficient to supply the camp during an exceedingly dry season. If a shortage of water is experienced, it will be necessary to increase the size of the storage reservoir. The watershed is sparsely populated. Bannock, two miles above with a population of 29; Laferty, five miles above with a population of 12; and Flushing, nine miles above with a population of 868, are the only communities contributing pollution. The stream receives little sewage pollution, and no mine drainage is known to enter the creek

above the dam. The character of the water is such, however, as to make purification necessary.

PROPOSED PURIFICATION PLANT.

The waters of Wheeling Creek, impounded by the concrete dam mentioned above, will flow by gravity through a conduit located along the C. L. & W. Railway tracks to a point near the mine where a line will be placed in order to carry the water to the proposed purification plant. The purification plant as designed has a capacity of 50,000 gallons per twenty-four hours and is comprised of a coagulating basin, chemical feed, a filter and clear well housed in one building located near the mine openings, and a distributing reservoir located on ground which has a greater elevation than the camp. The filter was designed and is to be installed by the William B. Scaife & Sons Company of Pittsburg. The construction is to be almost entirely of Washington fir.

Siphon Tank. The water from the reservoir will discharge into a siphon tank $2\frac{1}{2}$ feet in diameter and 3 feet high, having a capacity of 90 gallons. This tank is to be constructed of 3-16 inch sheet steel and will discharge directly into the coagulating basin. A baffle is provided and an adjustable weir, whereby a proportional amount of water will be allowed to pass into the coagulant solution tank.

It is observed by consulting the specifications and plans, that they fail to agree in the dimensions of the tank; the dimensions given were taken from the plans submitted.

Coagulating Basin. The coagulating basin, which is constructed with a conical false bottom in order to facilitate the removal of sludge, is 13 feet in diameter and 7 feet 5 inches deep, which provides a capacity of 6,000 gallons, which is equivalent to approximately 3 hours flow. The tank is provided with baffles in order to insure a complete coagulation of the raw water.

Coagulant Solution Tank. The coagulant solution tank which is 2 feet in diameter and 2 feet deep, is divided into three horizontal compartments known respectively as the clear solution compartment, the excelsior filter compartment, and the alum compartment. The capacity of the tank is approximately 47 gallons, but owing to the fact that a portion is utilized by the excelsior filter and the solid alum, there is not over 16 gallons capacity available for the storage of the solution.

Reagent Solution Tank and Regulator. A solution tank, 3 feet in diameter and 2 feet deep, having a capacity of 106 gallons, has been provided for the storage of hypochlorite solution, which it is proposed to use only at such times as the State Board of Health shall deem necessary. The regulating tank is simply a constant head box which is to be used for the purpose of introducing the bleach solution at a constant rate. The solution is to be applied to the water as it flows from the siphon tank to the coagulating basin.

Filter. One filter, 5 feet in diameter and 7 feet 5 inches deep, is to be provided. The area of the filter is 19.64 square feet, which is sufficient to filter an amount of water slightly in excess of 50,000 gallons when filtering at the rate of 125,000,000 gallons per acre per day.

Strainer System. A patent double cone brass strainer is to be used. The pipe manifold into which the strainers will be screwed will be embedded in concrete. No details of the strainer system are shown on the plans.

Filtering Material. The filtering medium is to be 44 inches in thickness and will be comprised of the following sizes of sand and gravel:

8 inches of gravel $\frac{3}{8}$ inch to $\frac{1}{2}$ inch greatest diameter.	
6 inches of sand, effective size, 1.56 m.m.; uniformity coef.....	1.25
6 inches of sand, effective size, .74 m.m.; uniformity coef.....	.27
24 inches of sand, effective size, .50 m.m.; uniformity coef.....	1.25

Wash Water Trough. A wash water trough is to be provided, but no details are shown on the plans.

Rate Controller. No dimensions are given for the rate controller which is to receive the filter effluent. An adjustable weir is provided in order to regulate the flow from the controller to the clear well. The weir is so arranged that a rate in excess of 125,000,000 gallons per acre per day cannot be obtained. The level of the water in the controller actuates a float valve which will either increase or decrease the rate of filtration as the head varies.

Clear Well. A clear well having a capacity of 10,000 gallons has been provided and is to be located beneath the coagulating basin and filter. The clear well will provide a storage of 4.8 hours when the pumpage is 50,000 gallons per day.

Distribution System. A distribution system of 6-inch and 4-inch cast iron pipe will cover the entire area of the community and will make the water supply available to the entire population. The length of the distribution system is 1.54 miles, of which 1640 feet is 6-inch and 6500 feet is 4-inch pipe.

Distributing Reservoir. A distributing reservoir with a capacity of 35,000 gallons is to be located on an elevated piece of ground immediately to the rear of the mining camp.

Operation. The plant is designed in such manner as to make it nearly automatic. The float arrangement which is attached to the rate controller increases the head in the box as the level of the water in the clear well is increased. The rate of filtration is therefore gradually decreased until it is completely stopped when the clear well is filled. Owing to this fact, the head on the filter increases, which in turn affects the coagulating basin from which the extension to a float arrangement actuates a valve on the main supply line, thereby stopping

the flow of raw water. It will be readily seen, therefore, that as the clear well is emptied, the entire equipment will come automatically into use.

An adjustable weir is placed in the siphon tank so that a proportionate amount of water is discharged into the coagulant solution tank which is maintained full at all times. The coagulant, which is a saturated solution, will flow by gravity to the point of discharge from the siphon tank. A small diluting stream will be applied to the concentrated alum solution before it is applied to the water. It was stated by a representative of the William B. Scaife & Sons Company that the solution tank had a capacity sufficient to supply the water for a period of thirty-six hours. It will be observed that if this is true, the amount of solution will indeed be very small and the errors in measurements will be accordingly increased, which fact is sufficient ground for stating that the alum feed is unsatisfactory and that a more suitable design should be submitted.

ACTION OF THE BOARD.

At a meeting held August 15th, 1912, the State Board of Health approved the proposed water supply for the mining camp of The Provident Coal Company, to be obtained from an impounding reservoir in Wheeling Creek two miles above Fairpoint, and plans and specifications for a water purification plant, submitted by Messrs. George S. Baton & Company of Pittsburg, engineers for their company, subject to the following conditions:

1st. That a competent operator, satisfactory to the State Board of Health, be placed in charge of the plant;

2nd. That accurate records of operations including the quantity of water filtered be maintained and furnished to the State Board of Health at monthly intervals;

3rd. That revised plans providing for a more suitable method of applying the coagulant, satisfactory to the Engineer of the State Board of Health, be submitted before the contract for the installation of the plant is awarded; and,

4th. That this approval be void unless revised plans for the coagulant feed shall have been submitted prior to November 1st, 1912, and the plant installed prior to September 1st, 1913.

The company was informed that the Board was of the opinion that the quantity of water available from the impounding reservoir might be insufficient during dry seasons, and that it might be found necessary to increase the size of the reservoir.

REPORT ON PROPOSED WATER SUPPLY AND WATER PURIFICATION PLANT FOR THE PROVIDENT COAL COMPANY, NEAR ST. CLAIRSVILLE.

On February 27th, 1912, plans for proposed water supply for the Provident Coal Company, near St. Clairsville, were received from Kennon & Kennon, attorneys for the Provident Coal Company. On February 14th, 1912, a representative of the engineering department visited St. Clairsville and made a general examination of the proposed improvement. The following report was submitted:

Provident is a mining community of about 800 population, owned by the Provident Coal Company, which company is controlled by Pickands, Mather & Company of Cleveland. The community is located about $1\frac{1}{4}$ miles north of St. Clairsville in the north-central portion of Belmont County. The company owns about 60 acres of land and about 7,000 acres of underground coal rights. The topography of the locality is hilly and the maximum difference in elevation between the valleys and the hills is 200 feet. Drainage from Provident reaches Jug Run which flows in a northerly direction and discharges into Wheeling Creek about three miles from the camp. The geology of the locality shows the hills to consist of strata of coal, fire clay, shale, and sandstone, and the formations are covered in both the hills and valleys by a thin layer of drift.

The equipment of the Provident Coal Company consists of a coal tippie, power house, stable, and office building, and in the community the company owns about 50 dwelling houses provided for the miners. The population at Provident consists principally of foreigners. The sanitary conditions within the community are good considering the character of its inhabitants. The dwellings are well spaced and the surroundings are fairly clean. Loosely constructed privy vaults are in general use. At the present time some difficulty is encountered in providing water for domestic use. Owing to the scarcity of ground water only a few private wells are used and these furnish practically all the water used for drinking and cooking purposes. For industrial use the company owns a small impounding reservoir, located in the central western portion of the community, which collects the run-off from a small area. The water from this reservoir is used to some extent by the inhabitants for general domestic purposes, but as no distribution system is provided it is necessary that the water be carried from the reservoir in buckets.

During the past year the Provident Coal Company has decided to improve conditions by securing a water supply to provide for boiler use as well as to furnish water for domestic consumption within the community. It is the intention to provide a supply of a capacity of 100,000

gallons per day of which 50,000 gallons will be used for industrial purposes. The remaining 50,000 gallons is to provide for fire protection and domestic use. For the development of the supply, the company has retained the services of The J. W. Frazier Company of Cleveland, engineers. The engineers investigated the feasibility of a ground water supply and also a surface water supply and recommended the use of the latter. In the investigations for a ground water supply it was found that an insufficient quantity could be obtained, and furthermore, that the water was of unsatisfactory quality on account of its mineral characteristics.

PROPOSED SUPPLY.

The plans of the engineers provide for the development of a surface supply obtained by impounding the waters of Jug Run above the community. It is proposed to furnish the water thus obtained for industrial and domestic purposes without purification.

Watershed. The watershed of the stream above the proposed location of the dam is about one square mile in area. The topography is rather hilly and the run-off, therefore, will be quite rapid. Approximately 30 per cent. of the watershed is thinly wooded, 50 per cent. is in cultivated fields, while the remaining 20 per cent. consists of steep, rocky slopes. At the present time there are seven farm houses upon the watershed, which are accompanied by the usual out buildings. The proposed reservoir will necessitate the removal of one of these dwellings, but two will be left in close proximity to the reservoir.

It is proposed to control the watershed as far as is feasible to prevent pollution of the supply. It should be noted, however, that experience has shown that such control is difficult to accomplish.

Impounding Reservoir. For reservoir purposes an option has been secured by the Provident Coal Company on fifteen acres of land above the location of the proposed dam. The dam will be constructed of earth embankments with a concrete core wall in a restricted portion of the valley, and by this means the water will be elevated to a maximum depth of 20 feet. The area of the reservoir thus impounded will be approximately five acres and from the incomplete data available the average depth is estimated to be 12 feet. The total capacity of the reservoir will, therefore, approximate 20,000,000 gallons. A large percentage of the total area of the reservoir will have a depth of 5 feet or less and it may be expected that growths of micro-organisms will flourish at certain seasons of the year, imparting to the water an objectionable taste and odor. No details have been furnished to show the depth at which it is proposed to draw off the supply.

Quantity of Water Available. The average annual precipitation at St. Clairsville during the last 23 years has averaged 39 inches. Considering the character of the watershed, an assumption of 12 inches for

average annual run-off is conservative. On this basis the average annual yield of the watershed above the dam is 200,000,000 gallons. The minimum annual precipitation during the last 23 years occurred in 1892 when 25.9 inches were recorded. Assuming a run-off of 8 inches for that year, the yield of the watershed for the minimum year was approximately 133,000,000 gallons. As has been stated, a storage of 20,000,000 gallons will be provided to furnish the supply during continued periods of low precipitation. The loss from the reservoir by seepage and evaporation will total approximately 25,000,000 gallons per year, and as a large percentage of this loss occurs during the dryest season, it is apparent that the storage capacity of the reservoir will be barely sufficient to supply the consumption. It is also important to note that at such times the reservoir will consist largely of still water, which fact will favor the growth of algae and other organisms.

Quality of Water. A catch sample was taken from Jug Run near the proposed location for the dam. There was a normal flow in the stream at the time, but owing to the fact that it was frozen, it appears likely that the flow resulted from the melting of the snow and ice. Not much dependence can be placed in the analytical results for the reason that the sample is not representative of normal conditions, but it may be stated that the analysis indicates a water of rather low organic content, and suitable as regards its mineral content. The bacterial content, which would be expected, is high and the presence of intestinal organisms indicates it to be unsatisfactory for domestic purposes. The quality of the water obtainable by storage of the run-off should be judged by general considerations rather than by the analysis of a catch sample. It is possible that a water of fair quality will be obtained from the reservoir during a large portion of the time, but serious consideration must be given to the danger of occasional pollution which in the light of experience elsewhere seems inevitable.

Distribution System. No detailed plans of the distribution system have been prepared, but it is stated that it is the intention to supply a portion of the community by direct pressure from the reservoir which will furnish a head of 100 feet, and to furnish a small portion of the village lying at a higher elevation by pumping. For that portion of the distribution system supplied by pumping an elevated tank will be provided for storage.

SUMMARY.

From the foregoing report it will be seen that it is proposed to install a public water supply for Provident to be obtained by impounding the flow of a small stream and to furnish the same without purification. While the watershed is not thickly populated there are a number of possible sources of pollution of the supply. Considering the experience with similar installations in the past, it is evident that there would be

a constant danger of an epidemic of typhoid fever or other water-borne disease, arising from the use of the unpurified supply. Purification of the supply or that portion used for domestic consumption is obviously required.

ACTION OF THE BOARD.

At a meeting of the State Board of Health held March 21st, 1912, the plans for this proposed water supply for The Provident Coal Company and the community of Provident, near St. Clairsville, submitted by Messrs. Kennon & Kennon, attorneys for The Provident Coal Company, February 27th, 1912, were considered. The Board disapproved the proposed supply to be obtained by impounding the flow of Jug Run and used in an unpurified state.

The Board advised, if this was the only supply available, that detailed plans be submitted for the development of the supply, including a water purification plant to purify that portion to be used for general domestic purposes.

On April 29th, 1912, plans and specifications for a proposed water purification plant were received from The J. W. Frazier Co., of Cleveland, consulting engineers for The Provident Coal Company. Based on an examination of the plans and an inspection by a representative of the engineering department, February 14th, 1912, the following report was submitted:

A complete description of the proposed supply has been given.

The impounding reservoir is at such elevation that the water may be conducted by gravity to the buildings of The Provident Coal Company and to a large portion of the community. It is, however, necessary to pump the water to supply the necessary pressure in the extreme northeasterly section of the community. It is designed to locate a water purification plant near the buildings of the coal company, to which the water from the reservoir may be conducted by gravity and from which it may be pumped to the distribution system extending to all of the dwellings in the community. The supply to be used for industrial purposes will not be purified and will be conveyed in an entirely separate distribution system.

PROPOSED PURIFICATION PLANT.

The plans submitted by the consulting engineers are furnished by The Pittsburg Filter Manufacturing Company and provide for a gravity, mechanical filter plant with a capacity of 100,000 gallons per day. As it is roughly estimated that not over 50,000 gallons will be required for domestic consumption, the capacity of the plant is ample. The plans as submitted are of a general nature and contain insufficient detail to make possible intelligent examination. Plans in greater detail are required. In general the plans provide for a coagulating basin and

a filter, housed in one building. They do not include a clear well, and it is stated that this feature will be constructed by the coal company.

Coagulating Basin. The coagulating basin is to be constructed of seasoned cypress lumber and will be 14 feet in diameter by 12 feet deep. An inner tank, 6 feet in diameter, is formed by a circular baffle around the center of the basin. The annular space thus formed is 3.75 feet wide. A wall extends across the annular space and is continued as a baffle two-thirds of the diameter of the inner tank. The water from the reservoir enters through a float controlled valve near the cross wall, is treated with the coagulant, and leaves the basin from the central portion, passing by gravity to the filters. The water from the annular space overflows through a weir 12 inches wide by 18 inches deep, into the inner tank formed by the circular baffle, where it receives its final period of sedimentation. The total capacity of the coagulating basin is 13,800 gallons, equivalent to three and one-third hours' flow when the filter is operating at a rate of 100,000 gallons per day.

Filter. The filter will be of the wooden tub type, constructed of cypress and 7 feet in diameter. Its area is 38 square feet and to produce 100,000 gallons per day allowing ten per cent. wash water and waste, the unit will be operated at a rate of 125,000,000 gallons per acre per day. The strainer system consists of a manifold pipe from which extend at 6-inch intervals lateral pipes extending to the wall of the filter. The strainers are connected to the laterals at 6-inch intervals. The strainer system will be covered by a layer of gravel 8 inches in thickness, and filter sand 39 inches in thickness. The gravel will be of a size varying from $\frac{5}{8}$ inch to $\frac{3}{16}$ inch in diameter, while the sand is to have an effective size of from 0.44 m.m. to 0.58 m.m. and a uniformity coefficient not greater than 1.7. To assist in washing the filters, rakes are provided to agitate the material, and these will be operated by a three horsepower motor. The wash water trough is placed around the wall of the filter.

In order to control the operation of the filter, a rate controller of the type manufactured by The Pittsburgh Filter Manufacturing Company will be used. This rate controller has been employed in several small plants throughout Ohio with successful results. No loss of head gauges to indicate the necessity of cleaning the filter, are provided, and these may not be required in so small an installation.

SUMMARY.

From the foregoing report it will be noted that in compliance with the requirements of the Board, The Provident Coal Company has made arrangements for the installation of a water purification plant to purify that portion of the supply to be obtained from a tributary of Jug Run, which will be used for domestic consumption. The plans furnished by The Pittsburgh Filter Manufacturing Company to the consulting engi-

neers are insufficient in detail and should be supplemented by complete detailed plans. The general features, however, are sufficiently well shown to warrant provisional approval. It is also necessary that complete plans of the clear well be submitted by The Provident Coal Company.

ACTION OF THE BOARD.

At a meeting held May 9th, 1912, the State Board of Health approved the plans for a proposed water supply for The Provident Coal Company and the community of Provident, near St. Clairsville, to be obtained by impounding a small tributary of Jug Run, received February 27th, 1912, and the general plans for a purification plant to purify that portion of the supply to be used for general domestic purposes, received April 29th, 1912, subject to the following conditions:

1st. That before the construction of the plant is begun, complete detailed plans for the entire plant be submitted to and receive the approval of the State Board of Health.

2nd. That samples of filtering material be submitted to and be approved by the engineer of the State Board of Health.

3rd. That The Provident Coal Company employ an operator whose only duties shall include the operation of the water purification plant and care of the water supply.

4th. That the plant be installed before water from the proposed supply is furnished for domestic use.

The Board advised that in the foregoing approval it was understood that only the general project of installing a water purification plant of 100,000 gallons capacity was approved, and that none of the details of said plant could be approved until detailed plans were submitted.

Subsequently, The Provident Coal Company failed to enter into a contract for the installation of the plant.

On September 10th, 1912, plans for the proposed water purification plant for The Provident Coal Company, near St. Clairsville, were submitted to the State Board of Health by The J. W. Frazier Company of Cleveland, engineers for the company. These plans were furnished by the Wm. B. Scaife & Sons Company of Pittsburg. The plans were examined in the engineering department and the following report was submitted:

PROPOSED WATER PURIFICATION PLANT.

The plans of the Wm. B. Scaife & Sons Company provide for the installation of a gravity mechanical filter plant, with a capacity of 100,000 gallons per 24 hours. The details of the plans include a raw water siphon tank, a coagulation basin, a gravity filter, and a clear well.

Siphon Tank. The raw water from the reservoir will discharge into a siphon tank three feet in diameter and two feet in depth. The ca-

capacity of the tank is approximately 100 gallons, and it will, therefore, discharge at intervals of 1.4 minutes when the plant is operating at its nominal capacity. The function of the siphon tank is to provide for an accurate application of the hypochlorite solution when this chemical is used for sterilization.

Coagulation Basin. The coagulation basin is constructed of cypress and is cylindrical in shape with a conical bottom. The basin is 15 feet in diameter by 8 feet 10 inches deep in its deepest portion, and has a capacity of 10,000 gallons. This is equivalent to a period of 2.4 hours flow when the plant is operating at its nominal capacity. The tank is provided with baffles to promote the distribution of flow. The capacity of the tank should be increased to three hours to provide sufficient sedimentation.

Application of Coagulant. It is proposed to use alum as a coagulant and to normally introduce about three grains per gallon. The device for the application of the coagulant consists of a so-called coagulant saturator two feet in diameter by two feet in depth. The alum in solid form will be placed in the saturator resting upon a filter of excelsior. A measured amount of raw water will be introduced at the top of the saturator and the saturated solution will be applied to the water as it enters the coagulation basin. The piping is so arranged that the coagulant will be submerged at all times in order that the strength of the solution will be constant. The successful operation of this device is not assured and it may be required that it be replaced with solution tanks and an orifice feeding tank.

Hypochlorite Application. To provide for the application of the hypochlorite when required, a solution tank and feeding device is provided. The feeding device is so arranged that with each discharge of the raw water siphon an accurately measured quantity of the solution is introduced into the raw water. This device, if carefully manipulated, should produce satisfactory results.

Filter. One filter of the wooden tub type, constructed of cypress, and seven feet in diameter, is provided. Its area is 38 square feet, and to produce 100,000 gallons per day, allowing 10 per cent. for wash water and waste, the unit will be operated at a rate of 125,000,000 gallons per acre per day. The strainer system is imbedded in concrete which supports the filtering material. The filtering material will be obtained from Cape May and will be placed in the filter as follows:

Fine sand	2 feet
Medium sand	6 inches
Coarse sand	6 inches
Gravel	8 inches

The control of the operation of the filter will be provided by a rate controller of special design. The controller is provided with an adjust-

able weir, so arranged that a rate in excess of 125,000,000 gallons per acre per day cannot be obtained. The level of the water in the controller actuates a float valve which will either increase or decrease the rate of filtration as the head varies. The controller will be covered or placed beneath the floor to avoid contamination of the filtered water.

Clear Well. The plans do not show the details of the clear well, as this feature will be constructed by The Provident Coal Company. It was stated by a representative of the Wm. B. Scaife & Son Company that a clear well with a capacity of two hours storage, based upon the nominal capacity of the plant, will be installed. This storage, together with that of an elevated tank, will be sufficient to provide for temporary cessation of the operation of the plant.

ACTION OF THE BOARD.

At a meeting of the State Board of Health held October 23rd, 1912, these plans for the proposed water purification plant for The Provident Coal Company, and the community of Provident, near St. Clairsville, prepared by the Wm. B. Scaife & Sons Company, of Pittsburg, and submitted September 10th, 1912, by The J. W. Frazier Company, engineers for the coal company, were approved subject to the following conditions:

1st. That samples of the filtering material be submitted to and approved by the Engineer of the State Board of Health before the material is placed. (Samples of filtering material approved December 14th, 1912.)

2nd. That The Provident Coal Company employ an operator, whose duties shall include only the operation of the water purification plant and the general care of the water supply.

3rd. That accurate records of operation, including the quantity of the water filtered, be maintained and furnished to the State Board of Health at monthly intervals.

4th. That the coagulation basin be increased in size to provide a capacity of at least 12,500 gallons or a three-hour period of flow.

5th. That the method of applying the coagulant be changed if deemed necessary by the State Board of Health.

6th. That the water purification plant be installed before water for the proposed supply is furnished for domestic use.

7th. That this approval shall be void, unless the proposed water purification plant shall have been installed prior to July 1st, 1913.

REPORT ON PROPOSED NEW WATER SUPPLY FOR
PORTSMOUTH.

On May 20th, 1912, plans and specifications for a proposed new water supply for Portsmouth were submitted by Mr. J. F. Witmer of the firm of Witmer and Brown of Buffalo, New York, consulting engineers for the city. On May 27th, 1912, a communication was received from Mr. John M. Williams, director of public service, stating that the city had adopted the plans and specifications and requesting the approval of the State Board of Health. On May 28th, 1912, the chief engineer visited Portsmouth and together with the director of public service and the consulting engineer made an examination of the proposed improvement. The plans and specifications were reviewed and the following report was submitted:

Portsmouth, a city with a population of 23,481 in 1910, is located in Scioto County on the Ohio River at the mouth of the Scioto River. The city is devoted largely to manufacturing industries and during the past few decades has experienced a flourishing growth. The built up portion is largely in the valley of the Ohio River, and only a small percentage of the residential section is in the hills bordering the valley. The present corporation extends about three and one-half miles along the river and has an average width of about one mile. The topography of that portion of the city in the valley is rather level, the surface sloping gently to the river bank. The northeasterly portion of the city, however, is very hilly, which fact prevents the extension of the city in this direction. The underlying geological formations are shales and sandstones, outcrops of which are found in the sides of the hills. The drift is the result of weathering of the native rock and is largely clay.

The city is provided with a public water supply, has a separate system of sewers, and a number of miles of paved streets. A water supply taken from the Ohio River was installed in 1871, but the installation of sewers and the paving of streets have taken place in recent years. The sewage from the greater portion of the city is carried below the water intake, discharging into the Ohio and Scioto Rivers through several outlets. The sewage from the easterly portion of the city, however, is discharged into Lawson's Run which empties into the Ohio River about one mile above the intake.

PRESENT WATER SUPPLY.

As has been stated, the water supply of Portsmouth was installed in 1871, at a time when the population of the city was but a few thousand. The supply was obtained by placing an intake into the Ohio River at a point above the then built up portion of the city. A pumping station was located on the river bank opposite the intake and the

water was supplied through a distribution system by direct pumping pressure without storage. Since the installation of the supply the city has experienced a marked growth, especially in an easterly direction, and at the present time the intake and pumping station are opposite the central portion of the city. Practically no improvements in the supply have been made since its installation with the exception of the occasional purchase of new pumping machinery. No new pumping machinery has been installed since 1894, however, and as may be assumed, the present equipment is inadequate and in a very poor state of repair. Owing to the absence of facilities for storing the water, it is necessary to maintain constant pumping, and with the present equipment there is always a danger of an absolute failure of the water supply of the city. The necessity for immediate improvement is evident.

The records of the amount of water pumped have not been kept with any degree of accuracy. During July and August, 1908, six 24-hour tests were made and it was indicated that the average pumpage was 2,340,000 gallons per day. The pumping station engineer estimates that the present daily pumpage is 2,500,000 gallons. The excessive slippage of the pumps makes difficult an estimate of the quantity of water used.

The length of the distribution system totals 36.9 miles, consisting of 4-inch to 16-inch pipe; this includes 12.7 miles of 4-inch pipe which was laid prior to 1908. Since that time no pipe smaller than 6 inches in diameter has been used. It has been found that smaller mains become almost completely clogged by the deposits from the heavily silted river water. This condition will probably endanger the proposed new filtered supply until the mains shall have become properly cleaned. Thorough flushing and possibly disinfection will be necessary. The water supply is made available to almost the entire population by means of approximately 6,000 services. When the water has not an objectionable turbidity it is quite generally used for drinking purposes but at other times private wells are depended on. The scarcity of ground water makes the water from the private wells somewhat undesirable.

The quality of the present supply is unquestionably bad. The effect upon the typhoid fever death rate is well demonstrated in an appended table. It will be noted that the annual death rate from typhoid fever has been excessive, and in view of the general use of a polluted water supply, the high rates must be attributed to this cause. The average rate for the years 1895 to 1910 is 61.5, which figure is very high compared to the rates of American cities with water supplies of good quality.

PAST INVESTIGATIONS OF THE WATER SUPPLY IMPROVEMENTS.

During the past seven years there has been considerable agitation for an improved water supply for the city. In the early part of 1905 the

council appointed a special water commission of representative citizens to make studies and recommendations for an improved water supply. In March, 1905, at the request of a member of council, the chief engineer examined the water supply of Portsmouth with a view to demonstrating the necessity for improvements and pointing out the general methods to be followed. At this time it was found that the water supply was seriously polluted and the conclusions of the engineer's report, which was transmitted to the city council, were as follows:

"1st. It is decidedly necessary to the health and welfare of Portsmouth that a pure water supply be provided.

"2nd. The most practicable method of providing such a supply would be to filter the Ohio River water.

"3rd. The intake for the water works should be carefully designed with reference to preventing clogging and should be placed above the influence of local pollution."

In the fall of 1905, a special bond election for the installation of a mechanical filter plant was lost by popular vote. In 1906 the Board was requested by the commission to express its opinion as to the suitability of maintaining the existing water works intake and constructing a filter plant to purify the supply. At a meeting of the Board held June 19th, 1906, it was decided that this proposition would not be approved. In July, 1906, one of the assistant engineers visited Portsmouth and conferred with the water supply commission. At this time the desire of the commission to install an infiltration supply was expressed. The installation of such supplies at Gallipolis, Ohio, and Owensboro, Kentucky, doubtless influenced the choice of the commission to some extent. Exhaustive tests preliminary to the selection of such a supply were advised by the Board. Following this, studies of a gravel bar in the Ohio River were made, and in August, 1907, a sample was collected from a test well in Bonanza Bar, located opposite the city. At this time two vertical test wells had been driven. The sample was of unsatisfactory quality and no further tests of the bar were made.

In October, 1907, an examination was made by one of the assistant engineers of Tygart Bar, located on the Kentucky side of the river about one-half mile above Bonanza Bar. The analyses of the samples indicated a water of satisfactory quality for domestic use, and evidence showed that it was largely of ground origin and was not filtered river water.

In July and September, 1908, following the installation of a horizontal test well, representatives of the engineering department made examinations. The samples collected from the test well indicated the water to be of unsatisfactory quality, and wide variations in its mineral characteristics were noted. On September 26th, 1908, an application was made by the chairman of the water commission for approval of a new water supply obtained from the gravel deposits of Tygart Bar. October

20th, 1908, the State Board of Health conditionally approved the water supply to be derived from the gravel deposits in the Ohio River, located in the Tygart Bar about three-fourths of a mile above the city, provided:

1st. That a filtration plant of a design satisfactory to the State Board of Health be immediately installed whenever the water obtained from the Tygart Bar shall be deemed unsafe by said Board.

2nd. That detailed plans showing method of obtaining the water, together with all features of the new water works, be submitted to and receive the approval of the State Board of Health before work is commenced.

3rd. That the new works be designed and constructed under the supervision of a competent engineer experienced in matters relating to water purification.

In April and May, 1909, the plans of Mr. Samuel M. Gray; consulting engineer, were approved. Following this, more data became available regarding the unreliability of water supplies obtained by infiltration, and the city was advised to make more complete tests before commencing construction under the approved plans. Following this, several tests were carried on at which representatives of the State Board of Health collected samples, but until the summer of 1911 no conclusive data were obtained. An examination was made by a special committee of the Board and August 10th, 1911, the report and recommendation of the committee were adopted, said recommendation being as follows:

After viewing the bar, examining the plans, and considering all the information relative to the problem, the committee fails to find sufficient evidence to insure, or even make probable, the success of the proposed system. It is therefore unanimously recommended that the proposed plan be disapproved.

After this disapproval of the Board, the project of a new public water supply for Portsmouth remained dormant until the spring of 1912. At that time the city council accepted the resignation of the special water commission and engaged the services of consulting engineers to design a new supply to be obtained from the Ohio River and purified by sedimentation and mechanical filtration.

PROPOSED NEW SUPPLY.

In the installation of the new supply it is proposed to abandon entirely the existing intake and pumping station, to establish a new intake, and to install a purification plant and pumping station at a point some 4.6 miles upstream from the old intake. In general, it is proposed to construct a filtration plant with a capacity of 8,000,000 gallons, an entire new pumping station with modern equipment, and a distributing reservoir of 7,000,000 gallons capacity, from which the purified water will be furnished by gravity to the city.

The new installation is to be located between the villages of New Boston and Sciotoville on the north bank of the Ohio River. It is proposed to purchase an area of eight acres separated into three tracts by the Portsmouth and Haverhill Pike and the tracks of the N. & W. and the B. & O. Railroads, which cross the area. The property has a frontage along the river of 700 feet and extends some 1200 feet north.

SOURCE OF SUPPLY.

The Ohio River, which will constitute the source of supply, has a watershed area above Portsmouth of some 61,000 square miles, upon which there is a population of from 2,000,000 to 2,500,000. As is well known, the river is subject to considerable sewage pollution above Portsmouth, and the water is at all times unfit for domestic use. The turbidity is at times excessive and remains for long periods after high stages in the stream. The nearest source of sewage pollution above the proposed intake is at Ironton, about 25 miles above. Several smaller communities are located between Portsmouth and Ironton but these have no sewers discharging into the river. Sciotoville, an unincorporated community, with a population of about 1,000, is on the north bank of the river about one mile above the intake. At Sciotoville the Little Scioto River, a stream with a watershed of about 200 square miles, enters the Ohio River, and at times of freshet the water from this stream may influence the quality of the water at the intake. It is stated that owing to a curve in the course of the river, the deposition of silt takes place on the southerly side of the stream and that there is a constant scouring action in the channel on the north side. This fact will probably tend to prevent clogging of the intake.

In order to elevate the normal stage of the river to nine feet, a government dam is proposed to be located three miles below Portsmouth. This dam will no doubt influence the location of channels and the deposition of silt in the river. Its presence may also affect the quality of the river water by making possible the pollution of the raw water by sewage from Portsmouth.

INTAKE AND PUMPING STATION.

The intake, pumping station, and pump well are included in one contract in the engineers' specifications and may be described together. The plans and specifications provide for an intake consisting of cast iron pipe 36 inches in diameter, fitted with a strainer at the river end and extending with slight up grade to the pump well. The strainer consists of two 12-foot lengths resting on the bottom of the river. The upper half of the pipe is drilled with 1½-inch holes staggered 3½ inches on centers. The strainer holes will be covered with copper wire wrapped around the pipes and a screen of ¼-inch mesh or larger will be used

on the upper half of the pipes. The strainer will be located at a point 90 feet from low water mark on the Ohio shore and about 130 feet from the center of the navigation channel of the river. At extreme low stage of the river the mean depth of water at the location of the strainer is 13 feet. The upper end of the intake pipe leads to a pump well in which will be placed the low lift pumping machinery. This will consist of four 4-million gallon centrifugal pumps, two of which are to be installed at the present time. The centrifugal pumps connect with a header into which the intake line leads.

The pump well is to be circular in section, 20 feet in diameter by 64.5 feet in depth. The bottom will be of concrete, while the wall is to be constructed of vitrified brick and surrounded by a sheet steel casing. A sump in the floor will be drained by a small centrifugal pump. It is probable that with suitable construction the wall will be watertight and dry. The low lift pumps will discharge into a 30-inch cast iron force main leading to the subsidence basin.

The pumping station housing the well and low lift pumps will also contain the high duty pumps for pumping the filtered water. The design provides for four 4-million gallon vertical direct acting triple expansion pumping engines, two of which will be installed immediately.

PURIFICATION PLANT.

The specifications of the consulting engineers provide that the purification plant may be constructed in accordance with the plans prepared by them and also provide that the bidding contractor may submit plans in accordance with the specifications of the consulting engineers. Briefly, the specifications provide for the installation of a filtration plant, with a capacity of 8,000,000 gallons per day, consisting of a subsidence basin, coagulating basins, mechanical filters, clear well and superstructure, and with all of the necessary appurtenances. The specifications regarding the quality of materials used in construction, the construction work, and the principal dimensions, are specific, but the specifications for the details of the filter plant are general and admit of a proposal from a filter company with a special or patented device. The plans and specifications as drawn by the consulting engineers will be briefly described.

Subsidence Basin. A subsidence basin is to be constructed of reinforced concrete in excavation and located on the highest portion of the property to be acquired by the city. With the exception of one corner, the basin is rectangular, 288 feet long by 93 feet wide, and has an average depth of 13 feet. Its capacity is, therefore, 2.16 million gallons, representing a 6.5-hour period of sedimentation on the basis of 8,000,000 gallons pumpage. It is not stated whether or not this basin will be operated on the fill and draw basis but this will probably be the case owing to the advantages offered by such operation. The basin is divided

into five compartments by baffles, and each compartment will be drained by an 8-inch cast iron sludge line leading from a central sump into a main 12-inch cast iron drain extending along one side of the basin. The baffles will cause the water flowing through the basin to travel at an average velocity of 0.73 foot per minute. This velocity will tend to permit of the deposition of the larger suspended particles, but the fine silt, peculiar to the water of the Ohio River, will without doubt pass in suspension to the coagulating basins. In comparison to the period of retention in the sedimentation basins designed for Portsmouth, it is of interest to note that the Louisville design provides for a retention of three days, and the Cincinnati design a retention of 2.9 days. The records of Cincinnati for 1911 indicate that the average percentage removal of turbidity by the basin on the fill and draw basis was 61.8 per cent, the raw water having an average turbidity of 160.

Coagulating Basins. The plans of the consulting engineers provide for two coagulating basins of reinforced concrete construction, each with a capacity of 325,000 gallons. The specifications provide a total capacity of 700,000 gallons. The tentative plans of the consulting engineers provide for two units, each 85 feet in plan, 30 feet wide and 16½ feet in depth. Each drains to a sump at the center. No baffles for distribution of the flow to promote sedimentation are shown on the plans. The period of the coagulating basins, assuming 650,000 gallons capacity, is two hours, on the basis of 8,000,000 gallons pumpage. This length of sedimentation will be inadequate to sufficiently clarify the water of coagulant, and this will result in the rapid clogging of the filters. This will be especially true when it becomes necessary to use but one basin while the other is being cleaned. On the other hand, a long period of sedimentation is not desirable for in that case the coagulant will settle completely and the filters will probably pass a portion of the very fine suspended matter not removed by coagulation. Relative to the capacity of the coagulating basins, it is of interest to note that the Louisville design provides an 8-hour period, and the Cincinnati plant a 4.7 hour period. In a communication of June 7th, 1912, the consulting engineers expressed their willingness to provide a 3-hour period of coagulation at Portsmouth.

Filters. The specifications of the engineers and their tentative plans provide for the construction of eight reinforced gravity concrete filters, each with an area of 350 square feet and an approximate capacity of 1,000,000 gallons on the basis of operation at the rate of 125,000,000 gallons per acre per day.

The specifications regarding the strainer system and other accessories of the filters are broad and admit of the installation of any satisfactory type. The filters are to be provided with hydraulic valves operated from tables provided for each unit. It is also specified that each filter is to be equipped with a rate controller of the Venturi type

and a loss of head gage provided for the accurate control of the operation of the filters. The type of this apparatus is to be subject to the design of the contractor. The filtering material will consist of sand carefully screened and graded to have an effective size of from 0.4 to 0.6 m. m. The uniformity of the sand is not specified. The filtering material will rest upon $\frac{3}{4}$ inch to $\frac{1}{8}$ inch gravel surrounding the strainer system. A wash water tank with a capacity of 30,000 gallons and an air tank with a capacity of 6,000 cubic feet, telescoped within the water tank, are specified to furnish facilities for washing the filters. The approximate rate of washing is stated to be 3,000 gallons per minute, corresponding to a vertical rise of 14 inches. Air may be used with the wash water subject to the design of the contractor.

It will be noted that the specifications for the filters are too general to admit of intelligent criticism, and it will be necessary that detailed working drawings for the plant be submitted before its installation.

Clear Well. The clear well, to receive the filtered water, as shown on the plans, is to be placed beneath the filters and adjacent to the coagulating basins. The specifications provide a clear well with a capacity of 180,000 gallons, corresponding to a 0.5-hour period of storage. While this period is small, there is also to be provided a 7,000,000 gallon distributing reservoir which will supply storage sufficient for temporary cessation of operation. The only objectionable feature in the plans and specifications for the clear well is the fact that the filtered water is stored adjacent to the coagulating basins, from which leakage of polluted water is probable. Experience elsewhere has demonstrated the necessity of separating the clear water basin from other portions of the plant from which the filtered water might receive contamination. A double wall should be required for this portion of the plant.

Coagulating Devices. For the purpose of applying coagulant to the water from the subsidence basin, two lime solution tanks of 4,000 gallons each are specified. These are to be of concrete construction provided with mechanically operated agitators. Orifice tanks constructed of cast iron, porcelain lined and provided with calibrated orifices, are specified for the introduction of the solutions. To provide for sterilization of the water, if this should become necessary, two hypochlorite of lime solution tanks of 122 gallons each are to be constructed. These will be equipped with agitators and provided with an orifice feeding tank ready for operation. The capacity of the solution tanks is believed to be too small.

DISTRIBUTING RESERVOIR.

In order to provide storage for the filtered water as well as an equalization of pressure on the distribution system, it is proposed to construct a reinforced concrete distributing reservoir on the summit of

a high hill located between the proposed purification plant and the city. The reservoir when filled will furnish a static head of 200 feet above the central portion of the city and will furnish a pressure of about 40 pounds in the most elevated portions. The reservoir will be constructed in excavation and embankment. It will be lined with reinforced concrete and will be covered with a reinforced concrete roof supported upon piers of vitrified brick laid in cement mortar. The reservoir has the plan of a parallelogram, each side being 260 feet in length. Its depth to the overflow is 15 feet. For purposes of cleaning, a drain is provided by which the reservoir may be completely emptied. Manhole openings will be placed in the roof which will be tightly sealed to prevent contamination of the water. Connection to the distribution system is to be provided by a 24-inch line two and three-fourths miles long.

SUMMARY.

In the foregoing report it will be seen that the city of Portsmouth is at present provided with a water supply of very poor quality, the general use of which has resulted in an excessive typhoid fever death rate. Moreover, the city is in constant danger owing to the inadequate fire protection which the worn-out equipment affords, and there is immediate necessity of proceeding in the installation of a new supply. Consulting engineers were engaged recently, and it is desired to proceed with the construction of the intake during the coming low stage of the river. The plans of the engineers are not definite in detail, especially as regards the filtration plant. The plans and specifications for the intake and pumping station, however, are definite and provide for an installation which should prove satisfactory. The design of the distributing reservoir is also suitable. The general features of the filtration plant which may be criticised are the inadequate capacity of the subsidence basin and coagulating basins, and the location of the clear well immediately adjacent to the coagulated water. Changes in these features should be included in detailed plans which will be required before the plant is built.

ACTION OF THE BOARD.

At a meeting held June 19th, 1912, the State Board of Health considered the plans submitted by Messrs. Witmer and Brown, consulting engineers. May 20th, 1912, and approved those portions of the plans showing details of the intake, pumping station, and distributing reservoir, provided that the new supply be installed and placed in operation before January 1st, 1914.

The Board withheld approval of the plans and specifications for the purification plant, including the subsidence basin, coagulating basins, filters and accessories, and required that complete detailed working drawings and definite specifications for this portion of the installation be

submitted; and advised that in the preparation of revised plans and specifications for the purification plant, the following features be changed:

1st. The capacity of the subsidence basin should be considerably increased.

2nd. The capacity of the coagulating basins should be increased to at least three hours.

3rd. The clear wells should be built as an independent structure separated from the other portions of the plant, or should be protected against leakage from the coagulating basins by a double or hollow wall.

On August 13th, 1912, Mr. J. I. Hudson, resident engineer for the consulting engineers, submitted revised general plans and specifications for a proposed water purification plant for Portsmouth. These plans were prepared by the New York Continental Jewell Filtration Company, which company is to be awarded the contract for the installation subject to the approval of the State Board of Health. The plans and specifications were referred to the engineering department and after an examination of the plans and a conference with Mr. J. F. Witmer and Mr. R. E. Milligan, general manager of the New York Continental Jewell Filtration Company, the following report was submitted:

PROPOSED WATER PURIFICATION PLANT.

The plans of the New York Continental Jewell Filtration Company provide for a plant, the essential features of which are identical with those shown in the general plans and specifications prepared by the consulting engineers and submitted May 20th, 1912. Briefly, the plans provide for the installation of a purification plant comprising a subsidence basin, a coagulation basin, devices for chemical application, filters, and a clear well. The various portions of the plant are of such size as to provide a nominal capacity of 8,000,000 gallons per day.

Subsidence Basin. The subsidence basin is to be constructed of reinforced concrete and will be uncovered. It will be placed in an excavation and its sides and bottom will be made watertight as nearly as possible. With the exception of one corner, the basin is rectangular in plan, 288 feet long by 93 feet wide, with an average depth of 13 feet. Its capacity is, therefore, 2.16 million gallons, representing a 6.5 hour sedimentation period on a basis of an 8,000,000 gallon rate of pumpage. The basin is divided into five compartments by cross baffles and each compartment will be drained by an 8-inch cast iron sludge drain leading from a central sump into a main 12-inch cast iron sewer. The baffles are so placed that the water will travel in an alternately up and down direction. The size of the basin is such as to permit of the deposition of only the coarsest suspended matters by plain subsidence. During periods of excessive turbidity in the river water, the use of coagulants

to promote sedimentation will be required if any appreciable efficiency is to be obtained from the basin. It is stated by the consulting and designing engineers that provision for an outfit to coagulate the raw water at the low lift pumps will be included in the construction of the plant. The plans do not show sufficient detail of the inlet to the subsidence basin and this should be incorporated in detailed working drawings to be submitted to the State Board of Health at a later date.

It should be noted that the operation of the subsidence basin will be intermittent until the plant is operated at its ultimate capacity. For the present the water consumption is approximately 3,000,000 gallons, and the basins will be used nine hours during each day. The water first drawn from the basin during a day's run will, therefore, have had a period of subsidence of approximately $21\frac{1}{2}$ hours.

Coagulation Basins. The plans provide for two covered coagulation basins of reinforced concrete construction, each with a capacity of 500,000 gallons. This will provide a period of three hours when the two basins are in operation and when the pumpage is at a rate of 8,000,000 gallons.

The basins are each 129 feet long by 30.75 feet wide and 16.8 feet in average depth. The water enters the basin through an influent chamber in the dividing wall between the basins, at which point the coagulants will be applied. The influent is distributed across the basins by a broad weir. A wooden hanging baffle 15 feet from the inlet wall extends to within 3 feet of the bottom, placed to effect a distribution of the flow. At the outlet ends of the basins the water flows over a broad weir into a channel which conveys the settled water to the filters. The coagulation basins are drained to the sump near the inlet from which the drain leads to the sewer.

The operation of the coagulation basins will be intermittent until the plant is operated at its ultimate capacity, therefore the coagulated water which is left in the basin at the end of the day's run will receive 18 hours period of quiescence, before the operation of the plant is resumed on the following day. By this means practically all of the coagulant will be removed from the water, which fact will interfere with the efficiency of the filters. To avoid this condition means for the application of a small amount of coagulant at the outlet end of the basin should be provided.

Chemical Application. The plans and specifications provide for the application of lime and copperas as coagulants and calcium hypochlorite as a sterilizing agent. The lime solution will be stored into two reinforced concrete solution tanks of 7,000 gallons capacity, each provided with a concrete box at the top for slaking the lime. The tanks are covered and each provided with a mechanically operated rotary agitator. Each solution tank is connected to a cast iron porcelain lined orifice feed tank of special design. The copperas solution tanks are of reinforced

concrete, each with 4,000 gallons capacity, with dissolving tanks built into them at the top. These solution tanks are also provided with agitators and the effluent flows to the orifice tanks as in the case of the lime solution. For the hypochlorite solution the design includes two concrete tanks of 1,200 gallons capacity each, provided with small dissolving and mixing tanks equipped with mechanical agitators and orifice feed tanks.

In connection with the use of the chemicals it should be noted that the lime and iron treatment involves considerable difficulty, especially where the operator is inexperienced in the art of water purification. In smaller plants in Ohio, the lime and iron treatment has been generally unsuccessful either on account of the unsuitability for water or the inexperience of the operator. Good results at Portsmouth will be obtained if expert supervision is provided, but otherwise, more satisfactory results will be obtained by using another coagulant such as alum. The hypochlorite treatment must be carried on with the greatest of care and will require expert supervision.

Eight units of filters, each $14\frac{1}{2}$ by 24 feet in plan, or 348 square feet in area, are provided. The total filtering area is 0.064 acre which, at a rate of 125 million gallons per acre per day, will provide a gross filtering capacity of eight million gallons.

The filter tanks are constructed of reinforced concrete and are supported by columns and beams above the clear well. The filtering material will consist of 27 inches of sand with an effective size from 0.4 to 0.6 m. m., and a uniformity coefficient of 1.3 to 1.7. The sand will rest upon a gravel layer 9 inches in thickness composed of washed material $\frac{1}{8}$ inch to $\frac{3}{4}$ inch in diameter.

The strainer system is constructed of cast iron in flanged sections. The strainers are of special type patented by the contractor and are to be placed 6 inches apart on centers. The concrete flooring will be floated to the lugs immediately below the strainers. The water pipe, 6 inches in diameter, will connect at two points to the header of the strainer system. The wash water troughs extend longitudinally across the filters in three lines so that the maximum lateral distance of travel will be 16 inches. The edges of the wash water troughs are 12 inches above the sand which will permit of a rather low rate of washing of the filters. The normal water level when the filter is in operation will be 2 feet above the sand. To provide an available working head the effluent pipe is carried to a down draft pipe which may furnish a maximum available head of 13 feet. Under normal operating conditions the available head will be 9 feet which will be sufficient to provide a filtering rate of at least 100,000,000 gallons per acre per day. The control of the operation of the filters will be provided by loss of head gages and rate controllers of the Venturi type. The loss of head gages, as well as gages showing the level in the clear well, are placed upon an operating floor opposite each filter. The Venturi rate controller is not

provided with a gage, and as this feature is of importance in the control of the plant it should be added. The various valves in the piping are hydraulically actuated and for this purpose operating tables are placed at each filter.

The general design of the filters is such as to provide for operation under a large negative head and washing with air and water applied at a low velocity. A steel standpipe for the wash water will provide a storage of 30,000 gallons above an elevation 18 feet higher than the edges of the wash water gutters. This tank will be filled by duplicate rotary pumps of 225 gallons capacity per minute drawing water from the clear well. Telescoped within the wash water tank will be placed an air holder with a capacity of 6,000 cubic feet of free air.

A longitudinal pipe gallery is placed between two rows of four filters each and a lateral pipe gallery is extended across one end of the filters between the filters and the coagulation basins. The design of the pipe gallery is somewhat unsatisfactory in that insufficient room is provided to afford easy access to the piping for inspection and repair.

Clear Water Basin. The clear water basin is located beneath the filter and has a capacity to a depth of 9 feet below the normal water level on the filters of 200,000 gallons. It extends entirely under the filters and pipe gallery and is separated from the coagulation basin by a transverse pipe gallery 7 feet wide. If proper care is taken in the construction it is not likely that the filtered water will be contaminated. A 30-inch suction from the clear well leads to the high service pumps and two 4-inch suction lines lead to the wash water pumps.

Superstructure. The filters and a portion of the coagulation basins are to be covered by a brick superstructure. This building will contain a storage room for the chemicals in its upper story and a laboratory and offices on the lower floor. The building will also contain the solution tanks for the chemicals.

SUMMARY.

From the foregoing report it will be seen that the revised general plans and specifications for a water purification plant for Portsmouth are in their principal features satisfactory. The subsidence basin may be expected to produce a good removal of suspended matter providing a coagulant is used.

Provision should be made for the application of a coagulant at the low lift pumps. The details of the inlet end of the subsidence basin are not shown on the general plans and should be included in the detailed working drawings for the plant.

The coagulation basins are of satisfactory design and during normal operation of the plant will produce effective results. It should be noted, however, that with intermittent operation the water applied to the filters may be entirely devoid of coagulant which will reduce the efficiency

of filtration. To guard against inefficiency, provision should be made for applying a coagulant at the effluent end of the coagulation basins.

The chemicals for coagulation, namely lime and copperas, may prove satisfactory, although it should be noted that in several of the smaller plants of the state, the use of these chemicals has given poor results. The possibility of changing the coagulant should be recognized at this time. The use of hypochlorite of lime for sterilization requires the greatest care.

The filters are in general satisfactorily designed, although the sand depth (27 inches) is somewhat less than the general practice in this state and elsewhere. It may be necessary, following the regular operation of the plant, to increase the sand layer to a depth of three feet. In order to facilitate the control of the filters, a recording gage to indicate the rate of operation should be installed at each filter.

The clear water basin is satisfactorily designed, and the storage of the filtered water will not result in any deterioration in its quality. Its capacity combined with the capacity of the distributing reservoir is sufficient to provide for any ordinary interruptions in the operation of the plant.

ACTION OF THE BOARD.

At a meeting of the State Board of Health held September 12th, 1912, the revised general plans and specifications for a proposed water purification plant for Portsmouth, prepared by the New York Continental Jewell Filtration Company and submitted August 13th, 1912, by Mr. J. I. Hudson, resident engineer for Messrs. Witmer and Brown, consulting engineers for the city, were approved subject to the following conditions:

1st. That facilities for applying a coagulant to the raw water before its entrance into the subsidence basin and to the settled water prior to its application to the filters be provided;

2nd. That recording gages connected to the Venturi rate controllers be installed at each filter;

3rd. That samples of all filtering material be submitted to and receive the approval of the engineer of the State Board of Health; and that provision be made in the construction of the plant for increasing the thickness of the sand to a depth of three feet, such increase to be made when required by the State Board of Health;

4th. That the use of coagulants and sterilizing chemicals be at all times subject to the approval of the State Board of Health;

5th. That before the construction of the plant is begun, detailed working drawings of all features of the installation be submitted; such plans to be satisfactory to the State Board of Health and to include the following; (a) details of the inlet end of the subsidence basin, (b) details of the method of applying a coagulant to the raw water before

subsidence, (c) details of method of applying a coagulant to the settled water after its passage through the coagulation basins, and (d) details of recording gages to indicate the rate of filtration of each filter; and,

6th. That this approval be void unless the water purification plant shall have been installed prior to January 1st, 1914.

ANNUAL DEATH RATE FROM TYPHOID FEVER AT PORTSMOUTH.

Year.	Estimated Population.	Deaths from Typhoid Fever.	Rate per 100,000 Population.
1895	15,500	10	65
1896	16,000	11	69
1897	16,500	10	61
1898	17,000	9	55
1899	17,500	8	46
1900	18,000	11	61
1901	18,600	10	54
1902	19,200	13	68
1903	19,800	18	91
1904	20,400	16	78
1905	21,000	16	76
1906	21,600	11	51
1907	22,200	18	81
1908	22,800	—	—
1909	23,400	10	43
1910	24,000	15	62
Average .....	.....	12.4	61.5

REPORT ON PROPOSED IMPROVEMENT AND ENLARGEMENT OF WATER PURIFICATION PLANT AT SANDUSKY.

On June 3rd, 1912, plans and specifications were submitted by Mr. Robert L. J. Wagar, city engineer of Sandusky, for the improvement and enlargement of the water purification plant. In anticipation of the submission of the plans the principal assistant engineer visited Sandusky June 3rd, 1912, for the purpose of making an examination on the ground relative to the proposed improvements. The following report was submitted:

The original water works for Sandusky were installed by the city in 1876 and comprised a crib and intake in Sandusky Bay, a high service pumping station, standpipe, and distribution system. The supply was taken direct from Sandusky Bay without purification and upon

examination by the State Board of Health it was found to be unfit for drinking and domestic purposes.

On July 17th, 1907, a committee of the State Board of Health consisting of the president and the chief engineer investigated the question of further approval of new sewer outlets into Sandusky Bay and the best means of obtaining a satisfactory water supply. The results of this investigation are embodied in the following conclusions of the committee's report:

"(1) No more unpurified sewage should be discharged into Sandusky Bay until an improved water supply is obtained.

(2) The location of the water supply intake is such that, even with filtration, a safe and satisfactory water cannot be obtained at all times.

(3) The water supply and sewerage situation at Sandusky is in an unsatisfactory condition; and before the city spends money for filtration or other water works or sewerage improvements, it is important that the whole matter be carefully studied by an expert and that estimates be made of the cost and practicability of extending the intake to a location farther removed from the shore. Such location should be decided upon only after careful studies of the currents, and analyses of the water under different conditions. It may be found desirable to move the entire water works, including a future filtration plant, to a point two or three miles east of Sandusky and there extend the intake into Lake Erie.

(4) After the best plans for ultimately obtaining a safe water supply have been worked out, all future additions and improvements to the water works should be made in a manner consistent therewith; although it may be impossible to complete the plans for some years."

On September 16th, 1907, Mr. Olemacher, president of the board of public service, submitted plans for a proposed water purification plant which were considered by the Board at a meeting held October 31st, 1912.

The Board was unanimously of the opinion that the advice given the board of public service, to study in a thorough manner, with expert assistance, the best solution of the water supply for Sandusky, should be sustained. However, as the Board was not called upon to approve any change in the present intake, and the installation of a filtration plant, if constructed in the best possible manner and properly operated would undoubtedly very greatly improve the present supply, the Board voted to approve the plans upon the following conditions:

1st. That the operation of the plant, including the kind and amount of coagulant used, be at all times satisfactory to the State Board of Health;

2nd. That a storage capacity for filtered water, of at least 800,000 gallons, be provided before the plant is placed in operation;

3rd. That sample of strainer to be used be submitted to and receive the approval of the State Board of Health before the strainers are placed;

4th. That samples of the filtering material and specifications therefor be submitted to and receive the approval of the State Board of Health before this is placed;

5th. That there be submitted for approval detailed drawings showing method to be used to create equal flow through sedimentation basins and to maintain the same level in both basins.

6th. That there be submitted detailed plans and description of laboratory;

7th. That there be submitted detailed drawings showing method of making walls of clear well water-tight;

8th. That there be submitted full detailed plans showing how strainer system is to be installed;

9th. That the re-wash valve be arranged so that it can be opened and closed from the operating floor;

10th. That automatic rate controllers, as shown on plans submitted or of other design satisfactory to the State Board of Health be installed before the plant is placed in operation;

11th. That loss of head gages be installed before the plant is placed in operation;

12th. That the valve which controls the admission of unfiltered water to the distribution system be placed under lock and key, kept in the possession of the health officer, and that unfiltered water shall be used only in times of emergency and with his knowledge; and,

13th. That the plant be constructed under the immediate supervision of an inspector, representing the board of public service and the city engineer, experienced in matters relating to the construction of filtration plants.

It should be noted that the recommendations in the report of the committee were not followed by the city authorities although a mechanical filtration plant was installed at the original water works. This plant was constructed at a cost of \$125,000 in 1908, under the supervision of the city, and was put in operation in February, 1909.

PRESENT PLANT.

The present purification plant comprises six 18 feet by 20 feet rapid sand filters, having a combined capacity of 6,000,000 gallons in twenty-four hours; a 500,000-gallon clear water basin; two sedimentation basins, each having a capacity of approximately 500,000 gallons; a pipe gallery; air blower; and chemical solution tanks. The plant is laid out rectangular in plan, the central portion of the site being occupied by the filter house, to the east of which is located the sedimentation or coagulating basins and clear well, and on the west, the pumping station.

Intake. The water supply is taken from an intake crib in Sandusky Bay. The crib is located 1400 feet from the shore line approximately 3000 feet west of the central part of the city. It consists of wooden construction octagonal in section, about 30 feet in diameter, and is weighted down with rock. The top of the crib is 5 feet above the normal water level in the bay. The depth of water at the crib is said to be about 7 feet. The end of the intake pipe is raised $2\frac{1}{2}$ feet above the bottom of the bay and covered by a $\frac{1}{4}$ -inch mesh screen. The intake pipe as far as the shore line is 36-inch wrought iron and is imbedded in the bottom of the bay. From the shore line to the raw water pump well the intake line consists of a 36-inch brick conduit.

In the operation of the plant the raw water is lifted from the pump well by means of two De Laval steam turbine pumps to the sedimentation basins, the coagulant being applied by means of 2-inch brass solution pipes which discharge the alum solution into the suction of the raw water pumps. The coagulated water is pumped into the sedimentation basins, from which it is discharged over adjustable weirs into a concrete conduit which conducts the settled water through tributary pipes to the filters. After passing through the filters the water is collected in the clear well, from which it is pumped by the high service pumps to the standpipe.

Coagulating Basins. The coagulating or sedimentation basins are concrete structures, each 160 feet long by $28\frac{1}{2}$ feet wide by 16 feet deep, giving them a combined capacity of 1,000,000 gallons. The walls of the coagulating basins are constructed of lean mass concrete in which very large stones were placed. The walls were originally designed to act as gravity walls, although it is stated that they are not sufficiently heavy for this purpose. Each basin is provided with a vertical baffle so arranged that the treated water in passing through the tanks travels twice the length of the tank. The discharge from each basin is over a horizontal adjustable weir 10 feet long. Both basins are covered and the roof is supported by means of concrete columns. Based on the present daily consumption of water, which is estimated to be 6,000,000 gallons, the period of sedimentation in the tanks is four hours.

Filters. The plant at present is equipped with six rapid sand filters, each 18 feet by 20 feet, having a nominal capacity of 1,000,000 gallons. On the basis of 125,000,000 gallons per acre per day, the capacity of the plant is 6,200,000 gallons. The filtering material consists of 36 inches of seashore sand underlaid by $7\frac{1}{2}$ inches of drainage gravel which is placed directly over the strainer system. The filters are washed by back flushing through the strainer system. Filtered water is used for this purpose and is obtained from a high-service main. Air is applied to the filtering material through the strainer system. For this purpose a high pressure blower is used. There is no separate system of piping for applying the air and it is thought that maximum efficiency can best be obtained when the air and wash water are applied simultaneously as can only be done when a separate system of piping is provided. The filters are equipped with rate controllers which operate on the principle of the Venturi meter. These filter effluent controllers permit considerable variation in the rate of filtration, due to the difficulty in properly adjusting the various actuating devices. Loss of head gages are provided and are said to operate satisfactorily.

Clear Water Basin. The filtered water is stored in the clear well which is located between the sedimentation basins and adjoining the east end of the pipe gallery. This basin has a capacity of 800,000 gallons. Based on the present average daily consumption the storage period is

3.2 hours. Filtered water is pumped from the clear water basin by high service pumps to the standpipe, which is 180 feet high by 25 feet in diameter, with a capacity of 662,000 gallons.

PRESENT CONDITION OF PLANT.

Although in operation slightly less than three and one-half years, the water purification plant working at full capacity is barely able to furnish sufficient filtered water to meet the present demands. In addition the plant is in such a disabled condition that it may be necessary to suspend operation at any time due largely to the failure of the walls of the coagulating basin which have developed cracks of such size as to permit the leakage of 1,500,000 gallons of water in twenty-four hours, a part of which passes into the clear water basin.

Coagulating Basins. As previously stated, the walls of the coagulating basins are constructed of lean mass concrete and are not of sufficient weight for their acting as gravity walls, and in the absence of reinforcement, large cracks have developed due to excessive pressure. It is stated that the tops of the walls are tied together by the roof reinforcement although this is obviously inadequate. The east end wall of the basins, which also encloses the clear water basin, is sliding laterally due to water pressure within the basins. Although the movement is not very rapid, there is no doubt that if it continues deflections will develop which will wreck the entire structure. The bottoms of the basins are said to rest on filled ground as do also the columns supporting the roof. The walls of the clear water basin which separate it from the coagulating basins are said to leak considerably, and if this is true there is danger of polluting the filtered water by the entrance of coagulated water.

Filters. The method of cleaning the filters is inefficient as air and water are conducted through the same pipes, and as a result the efficiency of the filters is reduced owing to inadequate cleaning of the filtering material. The rate controllers are unsatisfactory as they do not provide for constant rates of filtration.

Pipe Gallery. The pipe gallery is so small and congested that it is very difficult to inspect or conduct repairs in this part of the plant. It is possible to rearrange some of the pipes so that the gallery will be more accessible.

PROPOSED IMPROVEMENTS AND EXTENSION.

Following the report of Mr. W. G. Clark of Toledo, consulting engineer, who together with the city engineer, Mr. Wagar, made a complete investigation of the plant, the city has recently appropriated \$120,000 for the purpose of making necessary repairs and increasing the capacity of the plant. Based on recommendations of the consulting engineer, the city engineer has prepared plans and specifications for complete reconstruction and enlargement of the coagulating basins, the installation of

four additional filters, a clear well, additional low service pump, and a rearrangement of the piping in the pipe gallery. The proposed changes have been designed to increase the nominal capacity to 10,000,000 gallons per day.

Coagulating Basins. As shown on the plans the coagulating basins will be increased in size to provide a capacity of 3,140,000 gallons. The two basins and clear well will be combined in one structure, 228 feet long by 158 feet wide, and constructed of reinforced concrete. The north basin will be 228 feet by 45.5 feet, the south basin 228 feet by 50.5 feet, and the clear well 122 feet by 56 feet; the total depth for all being 21 feet. The walls of the new structure will be 24 inches in thickness, built of reinforced concrete carried to bed rock, and appear to be well designed. Particular attention will be paid to the quality of materials used as well as a thorough inspection during construction. The floor of the basins and clear well consists of 8-inch concrete and will be carried to bed rock, which is found at a depth of 6 feet below the surface. Expansion joints will be provided at the connection between the floor and the walls. The basins will be covered with a 7-inch concrete roof supported by 14-inch concrete columns, spaced every 10 feet. The entire structure will be covered with earth to a depth of one foot, and the sides and end will be protected by a heavy earth embankment. The present side walls of the old coagulating basin will be used as longitudinal baffle walls for the new basin. The baffles are so arranged that the coagulated water will travel twice the length of the tank, 426 feet, before passing to the filters. The capacity of the proposed tanks will provide a sedimentation period of 7.7 hours, based on a nominal capacity of 10,000,000 gallons. There will be no change in the method of operation.

Filters. Four additional filters will be installed, making the total filtering area 3600 square feet, which, based on a rate of 125,000,000 gallons per acre per day will make the filter capacity 10,250,000 gallons per day. The filters will be 18 feet by 20 feet, the same as the old ones. The filter boxes are enclosed in 24-inch and 18-inch concrete walls, while the bottom consists of 24-inch concrete. The strainer system will consist of 30 rows of strainers spaced 8 inches on centers, with 18 strainers per row spaced 6 inches on centers. The strainer pipes are all tributary to a main 12-inch collector. Over the strainer system will be placed 9 inches of graded gravel, over which will be placed 2 feet 9 inches of sand. It seems advisable that a separate system of piping be used for applying air to the filtering material during washing. Three 14-inch steel wash water troughs of semi-circular section, spaced 6 feet apart, are provided for each filter. The top of the troughs will be 16 inches above the surface of the sand. No details have been submitted showing the type of rate controllers to be used as it is understood that this has not been definitely decided upon.

Clear Well. A clear well will be provided in addition to the clear water basin located between the coagulating basins, making the total storage capacity for filtered water 2,600,000 gallons. This well will be located $12\frac{1}{2}$ feet east of the coagulating basins and will be circular in section, 115 feet in diameter by 18 feet deep, with a capacity of 1,500,000 gallons. The well will consist of reinforced concrete construction, with a 16-inch wall and 8-inch bottom. The cover will consist of 7-inch concrete supported by 16-inch concrete columns spaced $13\frac{1}{2}$ feet on centers. The high service pump suction will consist of a 30-inch cast iron pipe and is planned to accommodate both clear water basins.

Pipe Gallery. The pipe gallery will be so rearranged as to provide more space between the pipes, thus making them more accessible both for inspection and repair. The principal change will consist in reducing the size of the treated water line from 30 to 24 inches, and in so rearranging the pipes as to provide a larger passage way through the gallery. The size of the pipe gallery will remain the same.

A sump well will be located just east of the coagulating basins and at such a depth as to provide for the ready removal of sludge from the coagulating basins and clear water basins. This well will be of concrete construction, 14 feet square by 15 feet deep, and will be equipped with a 10-inch centrifugal pump directly connected to a motor which will serve to discharge the drainage from the basins to an old 30-inch sewer.

An additional low service pump will be installed. The type of pump has not been definitely decided upon although it will probably be of steam turbine type similar to those at present in use and will have a capacity of 3,000,000 gallons per twenty-four hours.

SUMMARY.

In summarizing, attention should be called to the fact that the present water purification plant at Sandusky is in such bad condition that great difficulty is being experienced in supplying the city with filtered water, and it is necessary that something be done to insure the use of the plant during the present summer. The plans submitted by the city engineer for the approval of the State Board of Health contemplate a complete restoration of the present plant as well as provide for an increased capacity for future growth of the city.

The design of the coagulating basins and clear water basin is satisfactory. Ample storage for filtered water is provided. The proposed new filters will be essentially the same as the filters at present in use, which are in general satisfactory, although it is thought that a separate piping system for the application of air during washing is necessary for efficient operation. The rate controllers on the old filters are inefficient and should be replaced by more suitable devices for controlling the rate of flow of the filter effluent. The installation of an additional low

service pump is necessary to provide for the proposed increase in capacity of the plant. The rearrangement of the pipe gallery will add greatly to the proper maintenance of the plant.

Although the changes as shown on the proposed plans will greatly improve conditions, it should be noted that the burden of purification necessarily carried by the plant could be materially decreased by moving the water works intake to a point where the raw water is not subject to dangerous pollution by the Sandusky sewage. The prevailing high turbidity as well as the grossly polluted water of Sandusky Bay, warrants the selection of a more suitable point of intake.

ACTION OF THE BOARD.

At a meeting held June 19, 1912, the State Board of Health approved the proposed improvement and enlargement of the water purification plant at Sandusky according to plans and specifications submitted by Mr. Robert L. J. Wagar, city engineer, June 3rd, 1912, subject to the following conditions:

1st. That samples of filtering material and specifications therefor be submitted to and receive the approval of the Engineer of the State Board of Health before being placed;

2nd. That detailed plans of rate controllers and loss of head gages for the proposed new filters be submitted to the State Board of Health for approval, and that the existing unsatisfactory rate controllers be replaced with efficient apparatus;

3rd. That the existing filters be overhauled and placed in perfect working condition;

4th. That provision be made whereby filtered water will be furnished to the consumers at all times during reconstruction, and to this end the use of a Smith sleeve and valve is suggested; and that plans and a statement of the method of carrying out this provision be submitted to and approved by the engineer of the State Board of Health before contracts for the installation are awarded;

5th. That the improvement and enlargement be made under the immediate supervision of an inspector experienced in the construction of water purification plants, representing the city; and,

6th. That there be submitted to the State Board of Health prior to October 1st, 1912, a design and estimate of cost for extension of the water works intake to a suitable location in Lake Erie.

The Board also called attention to the facts that while the proposed improvement and enlargement of the water purification plant would greatly increase its efficiency and provide for its constant operation, the necessity of extending the water works intake to a point from which a mildly polluted water will be obtained should not be overlooked; and that this improvement would be necessary if Sandusky Bay were to be continued in use as a receptacle for the sewage of the city.

REPORT ON PROPOSED NEW WATER SUPPLY FOR THE
SCIOTO COUNTY INFIRMARY, NEAR PORTSMOUTH.

On April 16th, 1912, a communication was received from Mr. John W. Hall, superintendent of the Scioto County Infirmary, requesting an investigation of a proposed new water supply for the institution. On April 24th and 25th, 1912, the engineering assistant visited Portsmouth and made an investigation of the proposed supply. The following report was submitted:

The Scioto County Infirmary is located about two and one-half miles west of the city of Portsmouth, some 2000 feet north of the Ohio River. The grounds of the institution cover an area of 400 acres and lie at the edge of the gently sloping valley of the Ohio River. North of the institution the topography is hilly. The geological structure consists of the Berea grit covered by alternating layers of shale and sandstone. The drift deposits are thin and are of a clayey nature. The Berea grit is somewhat impregnated with oil and salt water.

The institution was founded in 1883 and consists of a main building and several smaller structures. The population at the present time is 45 and the institution has a capacity to accommodate 75 inmates. A water supply has been in use for a number of years but is inadequate for fire protection. The sanitary conditions surrounding the institution are unsatisfactory, particularly as regards the disposal of wastes. Several poorly constructed privy vaults are used and one water closet discharging through a short sewer into Carey's Run, a tributary of the Ohio River. It is claimed that no nuisance is caused by the discharge of sewage without purification.

PRESENT WATER SUPPLY.

The present water supply of the institution is obtained from three cisterns and a drilled well. The cisterns are all located near the main building and the well is in a barnyard to the rear of the institution. Water pumped from the well and the cisterns is stored in three tanks having a total capacity of 1100 gallons, situated in the third floor of the main building. The water is used for general domestic consumption and for laundry and sanitary purposes. The quantity available is insufficient to supply fire protection for the institution, and the quality of the water is unsatisfactory.

PROPOSED NEW SUPPLY.

For the purpose of securing an adequate supply of water of more satisfactory quality, the authorities of the institution propose to use a deep well, and for storage purposes to install a reservoir of 35,000 gallons capacity. The site selected for the well is about 150 feet north-west of the main building in an abandoned barnyard. The surroundings of the well are in a rather untidy condition but may be improved at slight

cost. It is not thought that the presence of the institution with its out-buildings in such close proximity to the well will affect the sanitary quality of the water owing to the thickness of the impervious layers overlying the waterbearing horizon. A test well 8 inches in diameter has been drilled to a depth of 75 feet. Until a depth of 66 feet was reached, no water was encountered. At this depth, however, a strong flow rising to an elevation of 51 feet from the surface was struck. The following is a log of the formations penetrated in drilling:

Light shale	8 feet
Sandstone	4
Light shale	16
Sandstone	2
Shale	24
Sandstone	5
Black shale, waterbearing.....	16
Total depth	75

The casing of the well extends to a depth of 16 feet into a shale formation.

A pumping test to determine the available yield of the well was carried on for twenty-four hours, a small deep well pump being used for the purpose. The capacity of the pump at full speed, 18 gallons per minute, was furnished by the well without noticeable diminution of the supply.

Quality of Water. A sample of the water obtained from the well was collected after the twenty-four hours pumping test. The analytical results indicate that the physical characteristics of the water are somewhat unsatisfactory owing to the presence of a small amount of turbidity. This is, however, due to the newness of the well, which should not be considered as an indication of unsatisfactory quality. From a mineral standpoint the water is satisfactory as regards its hardness and iron content. Chlorine is present in large amount, which would indicate danger of the water becoming salted in the future. From a sanitary standpoint the water is satisfactory, although a high bacterial content is shown. This may also be attributed to the newness of the well. The absence of nitrogen as nitrates or nitrites is an indication of the absence of organic pollution. The high free ammonia and possibly the high chlorine may be attributed to traces of oil reaching the water from the Berea grit formation.

The possibility of future deterioration of the supply should be considered and the well should be protected against pollution by the removal of near-by sources of contamination.

ACTION OF THE BOARD.

At a meeting held May 9th, 1912, the State Board of Health considered the proposed new water supply for the Scioto County Infirmary.

near Portsmouth, to be obtained from a drilled well 70 feet in depth and located 150 feet northwest of the main building of the institution.

The Board voted to withhold its approval, analysis of the water from the proposed source of supply showing an abnormal chlorine content, indicative of salt contamination. The authorities were advised that steps should be taken to obtain a supply free from this objection, either by securing a new location for a well or by preventing the entrance of the salt water into the existing well.

EXAMINATION OF WATER FROM SCIOTO COUNTY INFIRMARY, PORTSMOUTH.

PARTS PER MILLION.

Sample Number.	Collected.	Color.	Turbidity.	Sediment.	Odor.	Oxygen Required.	Nitrogen as			
							Albuminoid Ammonia.	Free Ammonia.	Nitrites.	Nitrates.
11359	1912 Apr. 25	5	13	slight	none	1.58	.052	2.772	0	0

Sample Number.	Chlorine.	Alkalinity.	Incrustants.	Sulphates.	Residue on Evaporation.		Iron.	Bacteria.	
					Total.	Loss on Ignition.		Number per cc.	Colon Present.
11359	205	217	7.5	.....	564	52	.3	5500	Not in 10 cc.

Source of Sample.

Number.
11359. Tap on pump, Scioto County Infirmary.

REPORT ON ADDITIONAL WATER SUPPLY FOR SPRINGFIELD.

On January 22nd, 1912, Mr. George M. Cotter, superintendent of water works at Springfield, submitted plans for improvements to secure an additional water supply for the city. On February 7th, 1912, the acting chief engineer visited Springfield and conferred with Mr. Cotter re-

garding the proposed improvements. The following report was submitted:

The city of Springfield is located in the central portion of Clark County on the Mad River at its confluence with Buck Creek. Mad River is a tributary of the Great Miami River, which it joins at Dayton 31 miles farther downstream. The population of Springfield in 1910 was 47,000. The topography within and about Springfield is moderately hilly, but there also exists extensive level bottom lands in the stream valleys. These valleys contain glacial deposits consisting of clays and coarse gravels, the latter of which store large quantities of water and serve greatly to equalize the flow of the stream.

The general sanitary conditions of the city have in the past not been the best and a rather high typhoid fever death rate has prevailed. The cause of this typhoid fever has not been definitely determined, but it has probably resulted to some extent from the public water supply. Private wells, which are extensively used, have also without doubt contributed largely to the existence of typhoid fever.

In a report dated October 17th, 1910, is given a complete description of the public water supply, including its development since its installation. It will, therefore, be unnecessary to give in detail the past development of the supply. The original supply was installed in 1880, the water being taken by means of infiltration galleries in the gravel deposits of Buck Creek. With the growth of the city the supply became inadequate and numerous attempts have been made to augment it by various means. In 1903 an extensive system of underdrains was constructed to collect and convey the water from the gravel deposits to the pump well which constituted the source of supply. This method was, however, unsuccessful in greatly increasing the supply, and since that time the efforts to secure an adequate supply have been directed toward replenishing the underground supply by water from Buck Creek, applied at the surface of the ground or into open reservoirs.

A direct connection to Buck Creek was established in 1900 without the knowledge of the State Board of Health, by means of which it was possible to convey the water from Buck Creek directly to the pump well. This connection was used during the years from 1900 to 1908 at various times when the supply became inadequate. During the summer of 1908, when the usual shortage of ground water was experienced, an attempt was made to supplement the supply without resorting to the use of the water from Buck Creek directly. This plan consisted in flooding the surface of the gravel deposits upstream from the pump well and thus augmenting the underground supply. This scheme has been used intermittently since 1908. During 1909 a dam was constructed in Buck Creek to store water to provide for this flooding procedure. In May and July, 1910, the efficiency of the scheme for flooding was examined by the engineering department of the State Board of Health. The results of this

examination are contained in a report dated October 17th, 1910. In general it was found that satisfactory results could be obtained by flooding the surface, provided no use was made of the underdrains leading to the pump well and all water was forced to percolate through the gravel deposits in reaching the pump well. It was also found that with the use of the underdrains the passage of the flooded water through the gravel was so direct that the water reaching the pump well was contaminated and unsafe for use.

Proposed Improvements. From the past studies of the Springfield water supply which have been made by the water works officials and by the State Board of Health, it has been concluded by the local officials that a large percentage of the underflow in the gravel deposits is not intercepted by the pump well and is not available for the supply. Even with the employment of the flooding feature the supply is not greatly augmented, and it is thought that a large proportion of the flooded water escapes interception by the pump well. It is, therefore, intended as a first step to intercept the flow through the gravel deposits by the construction of galleries leading across the valley from the existing pump well. These galleries will be placed on the upstream side of an impervious wall of concrete or steel piling which it is proposed to construct across the valley. This wall will extend to the bottom of the gravel deposits, the top of the wall being near the upper portion of the gravel. By this means it is thought that the level of water in the gravel deposits will be constantly maintained at a depth of but a few feet below the surface.

A section of the deposits in the valley at the pump well has been secured by the drilling of a number of test wells. It has been found that the loam at the surface has an average depth of 4 feet, and that the gravel which lies immediately underneath has an average thickness of 6.2 feet. The gravel is underlaid by yellow or blue clay, which is immediately above the hardpan. This hardpan is found at an average depth of 24.4 feet below the surface. In constructing the impervious wall it is intended to rest the bottom upon the clay layer.

Following the construction of such an intercepting wall, the available quantity of the supply may be increased to such an extent as to make it unnecessary to augment it further by the addition of water from Buck Creek. Plans, however, have been prepared for the ultimate use of the water from Buck Creek in this manner. These plans provide for the construction of a distributing channel or trough, leading from the dam and discharging at various points upon the filtration areas located north of the pump well. The filtration areas are to be constructed by leveling the surface and throwing up small earth embankments to separate the units. No filtering material is to be imported and the natural soil will be depended upon as a medium. The total area to be ultimately used in this way is 21 acres, and for the first construction it is proposed to employ 8 acres. The units will be flooded by means of 10-inch laterals leading

from the trough and provided with valves. With the employment of these flooding areas or natural filters it is intended to abandon the use of the underdrains installed in 1903, and to thus provide for the passage of the water through the gravel deposits in reaching the pump well. With the first installation the flooded areas will be about 1800 feet from the pump well, but with the ultimate installation of future units the areas will be 1000 feet from the pump well.

The quality of water obtained from the gravel deposits by the use of the natural filtration areas is largely dependent upon the quality of the water from Buck Creek. It is apparent that no accurate control, such as is obtainable with slow sand or mechanical filters is possible with the use of natural filters, and, therefore, constancy in the quality of the water passing the surface is not to be expected. While the State Board of Health has made sufficient examinations at Springfield to learn that under certain conditions the flooding of the surface may be practiced with success, nevertheless, it appears logical to delay approval of this improvement until the necessity for it shall have been established and future studies have demonstrated its suitability at all times. The feature of the improvement to be immediately installed is the impervious wall extending across the valley to intercept the ground water flow. In any case, the use of such a wall will undoubtedly assist in increasing the available yield from the gravel deposits. After the installation of this portion of the improvement it will be advisable that examinations be made of the efficiency of the natural filtration, if this is used, before approval is granted.

ACTION OF THE BOARD.

At a meeting held February 15th, 1912, the State Board of Health approved the plans submitted by Mr. George M. Cotter, superintendent of water works on January 22nd, 1912, providing for the construction of an underground wall and galleries in the gravel deposits across the valley of Buck Creek to intercept the ground water flow and thus augment the public water supply.

The Board disapproved the general project of natural filtration of Buck Creek water by flooding areas north of the existing pump well, as shown on plans submitted by Mr. George M. Cotter, superintendent of water works on January 22nd, 1912, for the reason that there was not sufficient or satisfactory filtration of the water thus reaching the pump well.

REPORT ON PROPOSED NEW WATER SUPPLY FOR SWANTON.

On April 26th, 1912, preliminary plans for a proposed new water supply for Swanton were received from Mr. George Champe of Toledo, consulting engineer for the village. On April 29th, 1912, one of the as-

sistant engineers visited Swanton and investigated the proposed new supply. The following report was submitted:

Swanton, a village with a population of about 1,060, is located on Swan Creek in Fulton County, about nineteen miles west of Toledo. The local topography is flat and is broken only by the shallow valleys of the small streams. The underlying geological formation is the Ohio shale, which is covered by glacial drift of varying thickness. The drift consists largely of boulder clay and is not waterbearing. Its maximum thickness in the northwestern part of the state is about 160 feet, while at Swanton the drift deposits are approximately 60 feet thick. Between the clay deposits of the drift and the shale is encountered a gravel formation, and in practically all points in the north-western part of the state this gravel formation and the upper loose portions of the shale yield large quantities of water under artesian pressure. At Swanton, however, this supply of water is not encountered.

Present Water Supply. The present water supply of the village was installed in 1909. Previous to the installation of the supply a rather complete survey for available ground water sources was made and at only one point, namely, in the central portion of the village, was a suitable supply found. Although the location of the well was not all that might be desired, approval of the supply as shown on plat of the village submitted by Mr. George Champe, consulting engineer, was granted upon the following conditions:

1st. That samples of the water be submitted to the State Board of Health for analysis at regular intervals of not greater than six months.

2nd. That the council pass an ordinance prohibiting the use of any abandoned wells in the village for the purpose of disposing of domestic wastes, and providing for the abolition of cesspools and the reconstruction and maintenance of privies within 500 feet of the public water supply wells, in accordance with suggested list of rules and regulations appended.

3rd. That if in the opinion of the State Board of Health the public water supply becomes so contaminated as to be dangerous to health, the village shall seek a new supply.

4th. That detailed plans showing the method of developing the supply be submitted to and receive the approval of the State Board of Health.

Appended to this approval was a list of suggested rules for the construction of privies.

Later, in March, 1909, the detailed plans for the development of the supply were approved.

At the time of the installation of the supply it was estimated that the well would yield approximately 45,000 gallons per day. Since 1909, however, the yield of the well has gradually diminished and it has become necessary to reserve the supply for fire protection only. The supply is not furnished for general domestic or industrial purposes. It is stated that in order to fill the elevated tank, which has a capacity of 30,000 gal-

lons, it is necessary to pump the well six hours each day for twenty days. The supply has become depleted and is entirely inadequate for the purposes of the village. Owing to the rather complete search for available ground water sources which has been made, it is thought by the consulting engineer that it is unnecessary to prospect further, and he has confined his study to the development of a surface supply. The available surface supplies in the vicinity consist of Swan Creek, a small stream with a watershed of a few miles, and an ice pond fed by springs.

Proposed New Supply. The preliminary plans of the consulting engineer contemplated the development of a surface supply by the construction of a dam in a small ravine a short distance south-west of the corporation. About 500 feet above the proposed location of the dam there is a small pond which in the past has served as an ice supply for the village. The pond is approximately 100 feet long by 30 feet wide and has an average depth of 5 feet, giving it a capacity of 80,000 gallons. It is fed entirely by springs in its bottom and it does not receive any surface drainage. A small run which drains a few acres of farm land, passes the pond at an elevation below its bottom.

The plans for development provide for enlarging the pond by the construction of a dam across the small stream valley, by means of which the area will be increased to 31,000 square feet and the capacity to 10,000,000 gallons. The average depth of the proposed enlarged reservoir will be 5 feet, and the flow line will be at the elevation of the water in the existing pond. It is not intended to collect the surface drainage, and to avoid this it is proposed to construct a dike across the upper end of the reservoir and to carry the flow of the small stream underneath the reservoir through a 12-inch vitrified pipe. It will be noted that the source of supply for the reservoir is practically the same as that of the existing pond.

Regarding the quantity of water available from the proposed reservoir, no extensive data have been secured by the consulting engineer. A short pumping test was recently carried on to determine the yield of the pond. It was stated by the consulting engineer that a small centrifugal pump was operated for two hours at an average rate of 300 gallons per minute, by which 36,000 gallons were drawn from the pond, and the level was lowered $\frac{3}{4}$ inch, representing 5,000 gallons. The apparent large yield indicated by these figures is not to be depended on owing to the short duration of the test.

The quality of the water obtainable from the proposed new reservoir has not been demonstrated by analytical examination. The springs furnishing the supply may yield a water of satisfactory quality, but its storage in a shallow reservoir and exposure to sunlight will no doubt stimulate the growth of micro-organisms which will impart an objectionable taste to the water. Also the presence of the small stream introduces the constant danger that the surface flow may reach the pond, especially

as the underground conduit provided is of too small capacity to accommodate the storm flow. Extreme care would be necessary to prevent accidental pollution of the water supply during its storage in the reservoir. In order to safeguard the supply, a purification plant should be installed.

ACTION OF THE BOARD.

At a meeting held May 9th, 1912, The State Board of Health considered the preliminary plans for a proposed new water supply for Swanton, submitted by Mr. George Champe of Toledo, consulting engineer, on April 26th, 1912, and deferred action upon the proposition until furnished with data showing the available yield of the proposed source of supply.

The authorities were advised that the use of the supply would require the installation of a water purification plant and in order to expedite matters complete detailed plans for the development of the supply including a purification plant should be submitted with the data required.

Following this, the village abandoned the idea of developing this supply, and the most recent studies of the consulting engineer have been directed toward improving the existing supply.

On July 3rd, 1912, plans showing proposed extension and improvement of the existing water works system of Swanton were submitted by Mr. George Champe of Toledo, consulting engineer for the village. On June 21st, 1912, the principal assistant engineer visited Swanton and made an investigation relative to the proposed improvements. The following report was submitted:

PROPOSED EXTENSION AND IMPROVEMENTS.

The plans of the consulting engineer provide for the installation of a new pump, a storage reservoir, and extensions of the distribution system. It is intended to install an electrically-driven deep well power pump having a nominal capacity of 30 gallons per minute and operating under a head of 200 feet. The storage reservoir will be a reinforced concrete structure, 50 feet in diameter and 16 feet in depth to the flow line, furnishing a storage capacity of about 235,000 gallons. The reservoir will be covered by means of a conical wooden roof. The extension of the distribution system will comprise the installation of about one and three-fourths miles of mains, which will make the water supply available to all portions of the village.

Quantity of Water Available. It does not appear that adequate tests have been made to determine the degree to which the yield of the present water supply will be increased. The new deep well pump may add to the efficiency of pumping, but it is difficult to see in what way the yield of the well will be thus increased. A short test covering a period of

twenty-four hours was carried on, on July 9th and 10th, 1912, and showed a yield of 12,000 gallons with the present pumping equipment. It is apparent that this yield is inadequate to supply the village, and further steps must be taken to increase the present supply or locate an entirely new source of supply. The use of the water at Swanton has been restricted on account of the low yield of the well, but it is thought that with a plentiful supply the water will be quite generally used for domestic purposes. The extension of the distribution system, aside from providing fire protection, will also increase the desire for an adequate supply of good quality.

SUMMARY.

From the foregoing report it will be seen that the village of Swanton is at present provided with an inadequate water supply. Surveys of available ground water supplies have demonstrated the scarcity of water from this source, and a partial study of available surface supplies has demonstrated the difficulty of obtaining a suitable water supply in this manner. The proposed extensions and improvements of the system may assist in furnishing a supply for fire protection purposes but will not materially increase the supply to enable the village to furnish it for general domestic use. The extensions and improvements are badly needed as the village is constantly in danger of the effects of fires, but in permitting the construction of the improvements the Board should insist upon the installation of an adequate water supply.

ACTION OF THE BOARD.

At a meeting held July 18th, 1912, the State Board of Health approved the plans for proposed extension and improvement of the existing water works system at Swanton, submitted by Mr. George Champe of Toledo, consulting engineer, July 3rd, 1912, subject to the following conditions:

1st. That the village have a complete survey made of all available sources of water supply, both of ground and surface origin, with the intention of ultimately installing a supply of satisfactory quality and quantity; and,

2nd. That after the improved pumping facilities shall have been installed and before the other features of the water supply improvements shall have been made, a thorough pumping test of several days duration be conducted to obtain more reliable data regarding the yield of the present supply; and that said data be submitted to the State Board of Health.

The attention of the board of trustees of public affairs was called to the possibility of increasing the well yield by means of deep well explosions to open the water vein.

REPORT ON PROPOSED ADDITIONAL WATER SUPPLY FOR SYCAMORE.

On May 31st, 1912, there was received from Mr. O. J. Niebel, secretary, board of trustees of public affairs of Sycamore, a request for an examination of a proposed additional water supply for that village. On June 4th, 1912, the principal assistant engineer visited Sycamore and examined the proposed source of supply. The following report was submitted:

Sycamore, a village with a population of about 1,000, is located in Wyandot County on Sycamore Creek, a tributary of the Sandusky River. The village has a public water supply installed in 1898 and obtained from two 8-inch drilled wells which derive their supply from a limestone formation about 130 feet below the surface. Both wells are cased to the rock and the shallow subsoil water is excluded.

It is stated by the local officials that the existing supply is insufficient to furnish the needs of the village, and that it is necessary to secure an additional supply. The water derived from the wells is of good quality from a sanitary standpoint, but contains a high iron content and is objectionably sulphuretted. It would appear that the desire for an additional supply is prompted by the objectionable characteristics of the existing supply rather than by a shortage. The present daily consumption is approximately 45,000 gallons. The water is quite generally used for drinking and cooking and is supplied to about 90 per cent. of the population. The objectionable characteristics of the water have given rise to popular complaint both on account of the pungent odor and staining of plumbing fixtures. The improvement of the present supply could be accomplished without difficulty by installing a properly designed defer-rization plant in which an aerating device is included to remove the odor.

PROPOSED ADDITIONAL SUPPLY.

It is proposed to add to the present supply by taking the flow from a small spring located in the northwesterly portion of the village. The development of the spring would include the installation of a small pump discharging into the existing distribution system. The spring is located on property owned by Mrs. Salome Stalter, between the Northern Ohio Railroad and Sycamore Creek. It outcrops from the lower portion of the side of the valley of the stream and is in the natural course of the surface and subsoil drainage from a portion of the village. The yield of the spring is limited and at the time of inspection was estimated at 20 gallons per minute, or 28,800 gallons per 24 hours. At the present time the spring is curbed by a brick wall to a depth of 2 feet, and it is possible that proper development would increase the yield. At the present time the spring is not adequately protected against surface contamina-

tion and during periods of high water may be submerged. Within a radius of 500 feet from the spring there are about ten dwellings which under certain conditions might contribute pollution to the supply.

Quality of Water. A sample was collected from the spring by submergence and its analysis indicated the water to be unsatisfactory for domestic consumption. The chemical characteristics of the sample do not indicate a large degree of pollution although the color and odor point to vegetable contamination. The bacterial content is excessively high and intestinal organisms were found in a one c.c. portion. While the single analysis does not condemn the spring, the water should be viewed with suspicion.

At the same time a sample was also collected from the existing supply wells, and the analysis indicated a water of a high degree of purity but one with objectionable mineral characteristics.

ACTION OF THE BOARD.

At a meeting held June 19th, 1912, the State Board of Health considered the proposed additional water supply for Sycamore, to be obtained from the so-called Stalter Spring, as outlined in the request received from Mr. O. J. Niebel, secretary of the board of trustees of public affairs, May 31st, 1912, and the same was disapproved.

The Board advised that a competent consulting engineer be employed to investigate the feasibility of increasing the present supply by the installation of additional wells, and of improving the quality of the supply by installing a process for the removal of the iron and hydrogen sulphide.

EXAMINATION OF WATER FROM SYCAMORE.

PARTS PER MILLION.

Sample Number.	Collected.	Color.	Turbidity.	Sediment.	Odor.	Oxygen Required.	Nitrogen as			
							Albuminoid Ammonia.	Free Ammonia.	Nitrites.	Nitrates.
	1912									
11428	June 4	4	17	distinct	sl. musty	.74	.030	.518	0	0
11429	June 4	8	none	trace	sl. musty	.74	.038	.026	0	.6

Sample Number.	Chlorine.	Alkalinity.	Incrustants.	Sulphates.	Residue on Evaporation.		Iron.	Bacteria.	
					Total.	Loss on Ignition.		Number per cc.	Colon Present
11428	5	330	200	.....	748	76	2.0	90.	Not in 10 cc.
11429	5	280	52.5	.....	396	52	.3	5500.	Pres. in 1 cc.

*Source of Samples.**Number.*

11428. Tap at pumping station.

11429. Stalter Spring.

REPORT ON PROPOSED WATER SUPPLY FOR TWINSBURG.

On June 12th, 1912, Mr. P. P. Evans, secretary of The Wilcoxten Water Company, submitted a general plan of a proposed water supply for Twinsburg and a formal application for approval of the same. On July 6th, 1912, detailed plans for the development of the proposed supply were received from The Osborn Engineering Company of Cleveland, consulting engineers for the Wilcoxten Water Company. On June 26th, 1912, one of the assistant engineers visited Twinsburg and made an investigation of the proposed supply. The following report was submitted:

Twinsburg is an unincorporated community located in Summit County on Tinkers Creek, twenty miles southeast of Cleveland. The population is approximately 300. The community is entirely of residential character and has no industries excepting a plant for quarrying and crushing sandstone, and a small sawmill. The community has no public improvements. The private water supplies are taken from rain water cisterns and several springs emerging from the sandstone formations. Owing to the scarcity of ground water, there are few wells in use. The desire on the part of a number of the citizens to secure an adequate supply for domestic use has led to the organization of a company to install a small public water supply for the community.

The topography of the community and surrounding country is undulating. The drainage within the community reaches Tinkers Creek which flows in a northerly direction through its central portion. The principal built up portion of the community is at an elevation of 100 feet below the most elevated portions of the surrounding country. In the higher land surrounding the village the Berea sandstone outcrops, and at several points fairly strong springs emerge from this formation.

It is from one of these springs that the proposed water supply is to be obtained.

PROPOSED WATER SUPPLY.

In installing a water supply for the community, The Wilcoxten Water Company proposes to furnish water for domestic use only, and with this in view does not contemplate providing as extensive an installation as would otherwise be necessary. Briefly, the plans of The Osborn Engineering Company provide for the development of a spring from which the water will be supplied to the community by gravity through a small distribution system.

Source of Supply. The spring from which it is proposed to derive the water supply is located about one mile north of the built up portion of the community on the easterly side of the valley of Tinkers Creek. The water emerges from a sandstone formation and the flow is confined to one stream. The spring is favorably located as regards polluting influences, there being no buildings upon the area tributary to the spring within a distance of about one mile. In the valley of Tinkers Creek below the spring there are a few dwellings at a distance of 800 feet. The ground slopes upward in an easterly and southeasterly direction from the spring for a distance of about one-third mile, the total watershed area being two and one-fourth miles. There is every reason to believe that with proper development the quality of the water from the spring will be maintained. The water company will control an area of 70 acres surrounding the spring, which will insure its protection against future encroachment. This land is at present used for pasturing purposes, and in case this is continued it will be necessary to protect the supply from pollution by a well constructed fence.

The quantity of water available from the spring is shown by two gagings made by the water company. One of these measurements, made in the fall of 1911, showed a yield of 17,300 gallons per day; and the other measurement, made in the spring of 1912, showed a yield of 27,650 gallons per day. It is quite likely that this yield will be sufficient for the needs of the community for a number of years. Should the necessity of an additional supply arise, a second spring about one-fourth mile south of the proposed source, is available. The elevation of the spring is about 85 feet above that of the main portion of Twinsburg, and there is thus afforded the possibility of furnishing the supply by gravity.

Quality of Water. A sample collected from the spring was analyzed in the laboratories of the State Board of Health, and the results indicate that the water is of excellent quality from a sanitary standpoint and that it is also of good quality from the standpoint of its mineral content. It is entirely satisfactory for use as a public supply if proper methods of handling it are provided.

Development of Supply. The development of the spring will include the installation of a small spring box and a reservoir for storage and pressure. The plans of The Osborn Engineering Company provide for the construction of a rectangular concrete spring box covered with a wooden 2-inch tongue and groove plank roof. The concrete walls will extend 15 inches above the surface of the ground and will exclude surface drainage. They will be carried to a point a few inches below the water vein, or about 2 feet 3 inches below the surface of the ground. The plans do not show the details of the method of admitting the flow from the water vein to the spring box. It should be noted that an increasing yield of the spring may be made possible by extending the spring box to a depth of a foot or more greater than shown on the plans and by increasing the width. The water level in the spring box is maintained at a depth of $2\frac{1}{2}$ feet, which is a few inches above the ground level, by the level of the overflow in the storage reservoir. This will tend to prevent seepage from the surrounding ground into the spring. A 4-inch cast iron pipe will convey the water from the spring box to the reservoir, located about 130 feet from the spring.

The storage and distributing reservoir is to be constructed of concrete, 18 feet by 22 feet in plan and about 8 feet deep to the overflow, and will have a capacity of 24,000 gallons. It will be covered by a substantial wooden roof, which will assist in maintaining the quality of the water against deterioration. The connection of the distribution system is through a 4-inch pipe leaving the bottom of the reservoir. A 4-inch overflow will provide for the removal of the flow of the spring in excess of the consumption.

The distribution system from the reservoir will consist of 7800 feet of 4-inch and 4700 feet of 2-inch wood pipe mains. Five dead ends are shown on the plans, the existence of which will require frequent flushing to maintain good circulation in the mains.

A small portion of the flow of the spring is now conveyed to the home of the present owner through a 1-inch pipe, and in the proposed development this connection will be maintained.

ACTION OF THE BOARD.

At a meeting held July 18th, 1912, the State Board of Health approved the proposed water supply for the community of Twinsburg, as shown on a general plan submitted by Mr. P. P. Evans, Secretary of The Wilcoxon Water Company of Cleveland, on June 12th, 1912, and on detailed plans received from The Osborn Engineering Company on July 6th, 1912, subject to the following conditions:

- 1st. That a revised plan be submitted, showing the details of the spring box, particularly as regards the entrance of the water from the spring:

2nd. That two substantial fences be built around the spring, one immediately adjacent to it and one 300 feet or more distant; and,

3rd. That this approval be void unless the proposed supply shall have been installed prior to July 1st, 1913.

The company was informed that the Board was of the opinion, (1) that the proposed supply was of limited quantity; (2) that it might be possible to increase the yield of the spring by deepening and widening the spring box; and (3) that frequent flushing of the mains at the dead ends would be necessary to maintain the supply in good condition as delivered to the consumers, and facilities for such flushing should be provided.

EXAMINATION OF WATER FROM TWINSBURG.

PARTS PER MILLION.

Sample Number.	Collected.	Color.	Turbidity.	Sediment.	Odor.	Oxygen Required.	Nitrogen as			
							Albuminoid Ammonia.	Free Ammonia.	Nitrites.	Nitrates.
11480	1912. June 26...	none	none	none	none	0.0	.022	.006	0	3.4

Sample Number.	Chlorine.	Alkalinity.	Incrustants.	Sulphates.	Residue on Evaporation.			Bacteria.	
					Total.	Loss on Ignition.	Iron.	Number per cc.	Colon Present.
11480	2.5	18.	15.	.....	75.	29	.1	240	Not in 10 cc.

Source of Sample.

Number.

11480. Spring, sample from horse trough located about 800 feet from spring.

REPORT ON PROPOSED WATER PURIFICATION PLANT FOR WILLOUGHBY.

On August 6th, 1912, Messrs, Burgess and Long of Columbus, consulting engineers for the village of Willoughby, submitted plans and specifications for a proposed water purification plant for the village.

These were referred to the engineering department and the following report was submitted:

Willoughby, a village with a population of 2072 in 1910, is located in the western portion of Lake County, near the mouth of the Chagrin River. The growth of the village is moderate and its manufacturing activities are unimportant. Of later years the village has become a residential suburb of the city of Cleveland. The topography of the village and surrounding country is undulating to hilly. The streams including the Chagrin River have cut deep valleys with rather broad level bottom lands and precipitous slopes. The drainage from the village is to the Chagrin River, which enters Lake Erie about three miles north of the village. In the way of municipal improvements, the village is provided with a public water supply and a system of sanitary sewers.

RESUME OF INSTALLATION OF SUPPLY AND ACTIONS OF THE STATE BOARD OF HEALTH.

The water supply is said to have been built in 1885 although this date is not altogether certain. The original supply was obtained from an infiltration gallery located immediately north of the east branch of the Chagrin River, a short distance above its confluence with the Chagrin River. The infiltration gallery led to a pump well from which a suction 1000 feet long extended to the pumping station on the west side of the Chagrin River. The supply from the infiltration gallery became inadequate and a direct intake to the east branch of the Chagrin River was installed. This intake conducted the flow from the river to the pump well by gravity.

Early in 1908, it became evident to the village authorities that the public water supply then in use was of poor sanitary and physical quality, and they therefore determined to improve the supply. An engineer was retained to suggest a plan of procedure, but his services were later dispensed with and the village authorities determined to proceed with the development without expert advice. In August 1908, a representative of the State Board of Health visited Willoughby and found the new works partly constructed. Through a misunderstanding on the part of the village authorities, the proposition had not been submitted to the State Board of Health for approval. Briefly, the installation which was made at that time consists of a crude form of slow sand filter built in the bottom of the east branch of the Chagrin River, the main effluent pipe from which is connected to the suction main leading to the pumping station. Cook well strainers were laid horizontally in the bottom of the excavation, 4 to 5 feet below the surface, and connected with the main effluent pipe. Examinations of this supply were made by representatives of the State Board of Health in February and May 1909, and in September 1909 the State Board of Health disapproved of the water supply

of Willoughby and advised that steps be taken looking toward a new supply or the proper purification of the existing supply. In order to secure the approval of the Board for a temporary change in the public water supply of Willoughby and provide for the use of the natural filter installed, plans were presented by Mr. R. L. Pike, village engineer, with a request that the village be not required at that time to install a purification plant. The plans showed the installation of the natural filter and in April 1910, the Board took the following action: "The Board voted to require your village to present to the State Board of Health a definite plan for satisfactorily improving the public water supply not later than the time of the Board's meeting in October, 1910."

EXISTING WATER SUPPLY.

At the present time the water supply of Willoughby is obtained from the natural filter which was installed in 1908. The east branch of the Chagrin River, from which the supply is obtained, has a watershed area of about 50 square miles. The area consists of a rather hilly country resulting from stream erosion. There are a number of small communities on the watershed, and immediately above the present supply are a number of country homes which contribute to the pollution of the stream. The total population on the watershed is about 40 per square mile of watershed area. The natural filter consists of an excavation 108 feet long, 20 feet wide, and 5 feet deep in the hard shaley bottom of the river. In the bottom of the excavation are 20 Cook strainers, each 16 feet long and 6 inches in diameter, connected with a 10-inch collecting main extending along one end of the excavation. The strainers are covered with $\frac{3}{4}$ -inch to $1\frac{1}{2}$ -inch gravel. Above the gravel the filtering material consists of roughly graded sand and gravel. The main effluent pipe is connected with the suction main leading to the pumping station, so that water is drawn through the filter at varying rates dependent upon the pumpage. The old pump well is connected to the suction main by means of a valved pipe and is used in emergency. When it is used it is probable that water is drawn from the east branch of the Chagrin River directly. The present average daily consumption is from 165,000 to 175,000 gallons.

The quality of the public water supply of Willoughby has been demonstrated by several examinations of the State Board of Health. Previous to the installation of the natural filter, the quality of the water was frequently bad on account of the emergency intake into the east branch of the Chagrin River. Examinations of the natural filter, after its installation, indicated that the water obtained from it was improperly purified and was dangerous for domestic use. The village authorities were informed of the results and urged to purify and improve the supply. During the summers of 1909 and 1911, typhoid fever epidemics occurred

and were the cause of much alarm on the part of the village authorities. Both epidemics were investigated and it developed that the water supply was probably the primary cause of the infection.

PROPOSED WATER PURIFICATION PLANT.

The plans of the consulting engineers provide for the installation of a mechanical filter plant with a nominal capacity of 1,000,000 gallons per day. The plans do not provide for a change in the intake, and the source of supply may be the existing natural filter, the east branch of the Chagrin River, or the Chagrin River. The source of the supply will be determined upon after more complete study on the part of the consulting engineers, and whatever source is adopted it will be necessary to submit plans to the State Board of Health for approval. The plans provide for a low lift pumping station, two coagulation and sedimentation basins, two units of filters, a clear well, and high service pumps.

Low Lift Pumps. No definite plans nor specifications have been drawn for the low lift pumping machinery, although it is proposed to employ centrifugal pumps electrically driven and installed in duplicate. The pumps will discharge into a 10-inch main through a Venturi meter by which the quantity of raw water pumped may be measured. The coagulant will probably be aluminum sulphate and will be introduced at the low lift pumps. The treated water may be discharged into either of the two coagulation basins.

Coagulation Basins. These are rectangular reinforced concrete structures each 54 feet in length, 24 feet 6 inches in width, and 12 feet in depth to the flow line. The total capacity is therefore 233,000 gallons, corresponding to a period of flow of 5.6 hours when the plant is operating at a rate of 1,000,000 gallons per day. The basins are covered with a flat reinforced concrete roof, which will in turn be covered with a layer of earth 6 inches in thickness. The basins are each divided into two compartments by a longitudinal baffle wall extending through the center to a point 12 feet from one of the end walls. In this way a length of flow of 108 feet will be secured in each basin. The plans provide for no baffles to distribute the flow or prevent stratification, and it should be noted that this is of importance to secure the maximum effect of sedimentation. It may also be necessary to provide for the application of a portion of the coagulant at some point within the basin, in order that the maximum efficiency of the filter may be obtained. Three manholes are provided in the roof of each coagulation basin to provide means of entrance for inspection and cleaning. The floors of the basins are sloped toward the inlet ends where sumps are located for the removal of sludge. Eight-inch cast iron sludge drains lead to a sewer which discharges into the Chagrin River.

Filters. The effluent from the coagulation basins enters a 12-inch cast iron pipe line which conveys the settled water to the filters. These

are each 19 feet in length and 9 feet 3 inches in width. Two filters are provided so that the total sand area is 351 square feet. If the filters are operated at a rate of 125,000,000 gallons per acre per day, this area will provide a capacity of approximately 1,000,000 gallons per twenty-four hours. The plans and specifications provide that the filtering material shall consist of $2\frac{1}{2}$ feet of sand with an effective size of 0.32 to 0.38 m.m., and a uniformity coefficient of not more than 1.6. The filtering sand will rest upon graded gravel 18 inches in thickness and of four sizes. Immediately surrounding and 10 inches above the strainers the gravel will be of a size between 3 inches and $1\frac{1}{2}$ inches. Upon this a 4-inch layer will consist of gravel $1\frac{1}{2}$ inches and $\frac{1}{2}$ inch in diameter. Above this will be a 3-inch layer $\frac{1}{2}$ inch to $\frac{1}{4}$ inch in diameter. Above this will be a layer $\frac{1}{4}$ inch to $\frac{1}{12}$ inch in diameter. The strainer system is similar to that used in the Cincinnati water purification plant. A similar strainer system has also been installed in the purification plant at Niles. The strainer system consists of concrete channels covered with perforated brass plates extending across the filters. The concrete between the brass strainers is brought to an apex $7\frac{1}{2}$ inches above the strainer plates with an inverted V section. By this means a good distribution of the water entering through the strainers will be secured.

There are three wash water troughs to each filter, spaced 6 feet 4 inches apart on centers. The wash water travels a maximum distance of 2 feet 6 inches before reaching the troughs. It is proposed to provide rate controllers and loss of head gages for each filter to facilitate operation. The plan of the pipe gallery presents a logical arrangement to facilitate the inspection and repair of the piping. No connection is provided by means of which the water from the filters may be discharged into the sewer. It is important that such a rewash line be installed and this should be provided for in the approval of the State Board of Health.

The elevation of the wash water troughs above the sand is 24 inches. This will necessitate a rather high rate of washing, but owing to the design of the underdrain system it is not thought that this will be deleterious to the filters. The provision of 18 inches of gravel above the strainers tends to break up the velocity of the wash water entering the strainers, and thus prevents the washing of the gravel upward into the sand. A similar installation at Niles has given satisfactory results. The wash water will be pumped from the clear well when required.

Clear Well. The clear well, which is located near the other portion of the purification plant, is a reinforced concrete structure 45 feet square and 15 feet deep. Its capacity is 227,000 gallons, which provides a storage of 5.3 hours when the pumpage is 1,000,000 gallons per day. This is sufficient to provide for any ordinary emergency which may arise in the operation of the plant. In addition to the storage provided by the clear well, it should be noted that the existing distributing reservoir has a capacity of 300,000 gallons. The clear well is not provided with an overflow,

this feature being neglected no doubt to protect the quality of the water during high stages of the river. A reinforced concrete roof with two manholes, surfaced with a 6-inch layer of earth, is provided in the design.

High Service Pumps. As is the case with the low service pumping machinery, the plans and specifications do not provide definitely for the installation of high service pumps. It is desired to install electrically-driven pumps in duplicate, and if this is done the abandonment of the existing pumping station, which is in a poor state of repair, will be made possible.

SUMMARY.

From the foregoing report it will be noted that the village of Willoughby has been in the past and is at present provided with an unsatisfactory water supply. The pollution of this supply occurs at frequent intervals no doubt and has been ascribed as the cause of the typhoid fever epidemics which occurred in 1909 and 1911.

During the past four years the State Board of Health has frequently urged that a new supply be secured, or that a suitable method of purification of the existing supply be provided. It is of the utmost importance to the village that the water supply be improved at an early date, and the installation of a water purification plant according to the design of the consulting engineers will without doubt improve the supply and make it satisfactory for all domestic purposes.

ACTION OF THE BOARD.

At a meeting held August 15th, 1912, the State Board of Health approved the plans and specifications for a water purification plant for Willoughby, submitted August 6th, 1912, by Messrs. Burgess and Long of Columbus, consulting engineers for the village, subject to the following conditions:

1st. That plans of the intake, showing the proposed source from which the raw water will be derived, be submitted to and receive the approval of the State Board of Health;

2nd. That samples of the filtering material be submitted to and receive the approval of the engineer of the State Board of Health before being placed;

3rd. That the village employ as an operator a man competent in the supervision of water purification plants; that complete records of the operation of the plant be maintained and furnished the State Board of Health at monthly intervals; and that the village arrange to have made occasional examinations of the raw and filtered water by a competent analyst to determine the efficiency of the plant;

4th. That detailed plans and specifications of the loss of head gages and rate controllers be submitted to the engineer of the State Board of Health before being installed; and

5th. That this approval shall be void unless the water purification plant shall have been installed prior to January 1st, 1914.

REPORT ON PUBLIC WATER SUPPLY OF WOODSFIELD WITH REFERENCE TO THE NECESSITY FOR ITS PURIFICATION.

On July 30th, 1912, one of the assistant engineers visited Woodsfield for the purpose of examining the public water supply of that village. The results of this examination together with those of previous examinations have led to a consideration of the necessity of purifying the water supply. The following report was submitted:

Woodsfield, a village with a population of 2,500, is located in the central portion of Monroe County on the watershed of Sunfish Creek, a tributary to the Ohio River. The surrounding country is quite hilly, the maximum variations in elevation being somewhat over 300 feet. The geological formations comprise shale and sandstone covered by clayey soil, resulting from the weathering of the native rock.

Historical Description of Water Supply. The public water supply was installed in 1901, by The Woodsfield Water Company under the engineering supervision of Mr. L. E. Chapin of Canton, consulting engineer. The water company is operating under a twenty-five-year franchise providing for the purchase of the works at the end of that time by the municipality. The water supply was approved by the Board July 1st, 1901, provided that "proper measures be taken to protect the supply against surface pollution." In 1902, the Board granted permission for temporary use of the water from Sunfish Creek, the request having been made on account of a shortage of the regular supply. In 1906 the Board disapproved of the use of the impounding reservoir for fishing purposes by the Woodsfield Fishing Club. In spite of the disapproval, the club was organized and has utilized the reservoir to some extent. The requirements of the Board that the supply be protected have been disregarded in a measure, inasmuch as several oil wells have been located near the banks of the reservoir.

Source of Supply. The water supply installed in 1901 is obtained by impounding a small stream known as Whittenbrook Run, a tributary to Sunfish Creek. The area of the watershed is about one square mile and its topography hilly. The surface soil is largely clay and disintegrated shale. There are about seven houses on the watershed, all of which are near the divide. These houses are provided with ordinary outdoor privies, in the construction of which no especial care was taken. The reservoir is formed by an earthen dam about 40 feet high which impounds 40,000,000 to 50,000,000 gallons, with a water surface ten acres in area. The intake from the reservoir is located in the deepest portion and consists of a 10-inch cast iron pipe leading to the pumping station. A fence completely surrounds the reservoir but is ineffective in preventing access to the reservoir.

The water supply is pumped to a distributing reservoir located on the summit of a hill, a short distance north of the village. This is constructed in excavation 51 feet in diameter by 20 feet deep, giving it a capacity of 450,000 gallons. The walls and floor are of reinforced concrete, the interior of the walls being lined by a 9-inch brick wall. There is no covering and practically no protection is afforded against pollution. The exposure to the sunlight also promotes the growth of micro-organisms which at times impart to the water a decided taste and odor.

Quality of Supply. The quality of the water supply of Woodsfield is demonstrated by the analyses of samples collected at various times since the installation of the supply. The first sample collected in 1890 after a heavy rain showed a high turbidity and color, but no pollution of a dangerous character. A sample collected in August 1905, showed an increase in organic contamination and the presence of intestinal bacteria. A sample collected in 1906, was taken after a period of dry weather and showed some decrease in organic content but a very high bacterial content. The samples collected in 1910 showed the presence of a small amount of organic pollution. The sample collected recently in 1912 showed high turbidity and contained marked evidences of pollution.

In considering the quality of the water supply attention must be called to the inadequate provision for protecting the supply against deterioration. Almost every year trouble has been experienced due to tastes and odors resulting from algal growths, and no efforts have been made by The Woodsfield Water Company to prevent the occurrence of this trouble.

As a whole the analyses of the water supply, as well as the several examinations of the source and its development, have shown that the supply is entirely unfit for general domestic purposes. Obviously there is immediate necessity for its improvement.

ACTION OF THE BOARD.

At a meeting of the State Board of Health held September 12th, 1912, this report upon the public water supply of Woodsfield was considered and the Board found that this supply was unsuitable for use.

The attention of the water company and of the village officials was called to the matter and they were notified that the State Board of Health would give them an opportunity to be heard at its next regular meeting, to be held at the office of the Secretary, in Columbus, Wednesday evening, October 23rd, 1912, at 8 o'clock, to state what could be done to improve the quality of the present water supply.

At the meeting of the Board held October 23rd, 1912, Mr. R. W. Kinney, superintendent, and Mr. J. E. Kinney, representing the Woodsfield Water Company, were present. The financial condition of the company was explained and it was stated that the company would have to

raise the water rate in order to make improvements, and it was feared that such a raise would result in loss and possible litigation.

The Board voted to require the Woodsfield Water Company to submit plans for the purification of the water supply of Woodsfield, on or before its January, 1913, meeting.

EXAMINATION OF WATER FROM WOODSFIELD.

PARTS PER MILLION.

Sample Number.	Collected.	Color.	Turbidity.	Sediment.	Odor.	Oxygen Required.	Nitrogen as			
							Albuminoid Ammonia.	Free Ammonia.	Nitrites.	Nitrates.
3579	3/27/04	30 off	68	very sl.	veg.	2.77	.116	.008	trace	trace
4540	8/21/05	34	40	decided	veg.	3.18	.180	.142	none	none
5371	7/27/06	15	10	slight	moldy	1.79	.082	.138	.002	none
9936	10/20/10	6	5+	slight	earthy	2.25	.216	.004	trace	trace
9937	10/20/10	4	8	slight	veg.	1.95	.198	.042	0	0
11530	7/30/12	17	6	slight	sl. musty	1.68	.110	.016	0	.2
11531	7/30/12	15	87	heavy	musty	2.09	.124	.086	0	.4

Sample Number.	Residue on Evaporation.						Bacteria.		
	Chlorine.	Alkalinity.	Incrustants.	Sulphates.	Total.	Loss on Ignition.	Iron.	Number per cc.	Colon Present.
3579	3.1	19	25	.....	94	30	1.0*	1700	None.
4540	19.0	48	20	.....	146	31	2.7	850	In 1 cc.
5371	34.2	60	38	.....	158	82	none	40,000	Not in 50 cc.
9936	23	48	25	.....	154	39	.3	500	Neg. 1 & 10 cc.
9937	26	60	25	.....	162	43	.5	138	Neg. 1 & 10 cc.
11530	17	37	12.5	.....	107	19	.6	2100	Not in 10 cc.
11531	13	45	12.5	.....	137	22	2.9	750	Pres. in 1 cc.

Source of Samples.

Number.	
3579.	Public water supply.
4540.	Public water supply.
5371.	Public water supply.
9936.	Impounding reservoir.
9937.	Tap at Smith hotel.
11530.	Impounding reservoir.
11531.	Tap at Smith Hotel.

* Unfiltered.

REPORT ON PROPOSED WATER SUPPLY FOR
WORTHINGTON.

On May 3rd, 1912, a communication was received from Mr. G. H. Pagels, mayor of Worthington, requesting approval of a proposed water supply for that village. In anticipation of this request, one of the assistant engineers visited Worthington on April 23rd and 25th, 1912, and made an examination of the proposed site and a test well. The following report was submitted:

Worthington, a village with a population of about 550, is located about nine miles north of the city of Columbus in the northern part of Franklin County, half a mile east of the Olentangy River. The village is built on a knoll, the highest point of which is in its central portion, and drainage takes place to two small streams which flow through the northerly and southerly portions of the village to the Olentangy River. The topography of the village and surrounding country is rolling, and in the valley of the river are extensive flat bottom lands. The underlying geological formations are shales, and these are covered by drift deposits of glacial origin. In the valley of the Olentangy River the deposits consist of clay and gravel layers, the total thickness of the drift reaching 50 feet. Within the village, which is situated on more elevated ground, the drift deposits are almost entirely of clay and have a thickness averaging about 10 feet.

At the present time the village is not supplied with municipal improvements, but during the past year a bond issue was voted for the installation of a municipal water supply. The village has retained the services of Messrs. Burgess and Long of Columbus, consulting engineers, for the preparation of plans for the development of the supply and distribution system.

INVESTIGATIONS OF THE STATE BOARD OF HEALTH.

Preliminary examinations by representatives of the State Board of Health were made January 22nd, February 5th, and February 20th, 1912. At the time of the first examination, two available locations for public water supply wells were examined, one being situated immediately east of the village and the other one in the valley of the Olentangy River a short distance southwest of the village. The Griswold site, east of the village, is located at an elevation of about 20 feet above the highest point in the village. This site is suitably located as regards the proximity of polluting influences. Wells on this site would penetrate 10 or 12 feet of drift and enter a shale formation, from which the supply would be drawn. The water obtained from this shale formation is objectionable in its mineral content, particularly as regards the iron content. No test well was drilled on this site.

The Pagels site, located southwest of the village in the valley of the Olentangy River, is at an elevation from 70 to 100 feet below the highest point of the village. The site is at a safe distance from habitations or other sources of possible contamination. At the time of the inspection on February 5th, 1912, a test well on the Pagels site was examined. This well encountered water in a coarse gravel formation 34 feet below the surface, from which the water rose to within 7 feet of the surface. The following is a log of the test well:

<i>Material.</i>	<i>Thickness.</i>	<i>Depth.</i>
Surface soil	5 feet	5 feet
Blue gray shale.....	29	34
Coarse gravel	5	39
Yellow clay	3	42
Total depth of well.....		42 feet

The sample of water from this well indicated it to be of satisfactory quality from a sanitary standpoint, but the turbidity of the sample prevented an interpretation of the mineral characteristics of the water. Samples from various wells throughout the village obtaining water from the shale formations, indicated wide fluctuations in the mineral characteristics of the water, but all samples showed an objectionably high iron content and total hardness.

Following the drilling of a test well on the Pagels property, it was decided by the village to determine the feasibility of locating wells in the valley of the Olentangy River at a point opposite the central portion of the village.

PROPOSED WATER SUPPLY.

Site. The site proposed for the location of public water supply wells is situated in the valley of the Olentangy River about 1,700 feet west of the westerly corporation line of the village and one-fourth mile east of the river. The site has an area of one acre and is immediately north of the Dublin and Worthington Pike. It forms a portion of a land grant reserved for public school purposes. The immediately surrounding territory will, therefore, not be given over to residential purposes. At the present time there are no dwellings within 1,200 feet of the site. The nearest habitations are in the extreme westerly portion of the village. It is quite likely that the site will not be encroached upon by dwellings for many years.

Test Well. A test well has been drilled on the site to determine the available water supply. This well is 8 inches in diameter, 47 feet deep, and is cased to a depth of 37 feet, the remaining 10 feet being occupied by a No. 14 Cook strainer. The water supply is drawn from a gravel formation 6 feet 8 inches in thickness, encountered at a depth of 40 feet below the surface. The water rises from this formation to a point 33 feet below

the surface of the ground. It should be noted that the point selected for the drilling of the well is on a slight elevation, and wells drilled in the lower portion will probably make possible pumping by direct suction. Following is a log of the test well:

<i>Material.</i>	<i>Thickness.</i>	<i>Depth.</i>
Surface soil	6 feet	6 feet
Hardpan, containing pebbles.....	34	40
Gravel, waterbearing	6 ft. 8 in.	46 ft. 8 in.
Hardpan	0 ft. 4 in.	47 ft.
Total depth of well.....		47 feet

The similarity to the formations encountered in the test well on the Pagels property is apparent, and it is quite likely that the gravel layer is extensive throughout the valley; and if this is true, the supply of water should be adequate for the needs of the village.

Quality of Water. Samples from the test well were taken on April 23rd and 25th, 1912. The first sample was collected after a pumping test of six hours duration and at that time the water had a heavy turbidity which interferes with the interpretation of the analysis. Following this the strainer was cleaned, and on April 25th, after a period of pumping of 26 hours at a rate of 60 gallons per minute, a second sample was collected. The analysis of this sample indicates that the water is satisfactory in its physical characteristics, the slight turbidity being attributed to the newness of the well. The mineral content is also suitable, the hardness being comparable to other ground waters of the state. The iron content is especially satisfactory. From a sanitary standpoint, the water may be classed as one of good quality and the analysis contains no evidence of organic contamination aside from the small nitrogen content. On April 25th a sample was also collected from a private drilled well in the valley of the Olentangy River about five-eighths mile south of the test well. This private well obtains its water from the same gravel formation and the analysis indicates water of the same quality as that obtained from the test well.

No plans for the development of the supply have been prepared by the consulting engineers, it being first desired that approval of the Board of the proposed location be secured.

ACTION OF THE BOARD.

At its meeting held May 9th, 1912, the State Board of Health approved the proposed water supply for Worthington to be obtained from wells drilled on a site located 1,700 feet west of the westerly corporation line of the village and immediately north of the Dublin and Worthington Pike, as described in a request received from Mr. G. H. Pagels, mayor, on May 3rd, 1912, subject to the following conditions:

1st. That before contracts for the installation of the supply are awarded, complete detailed plans of the development be submitted to and receive the approval of the State Board of Health;

2nd. That an area of at least one acre be acquired for water supply purposes;

3rd. That the village council pass an ordinance preventing the establishment of privy vaults, cesspools, or other sources of contamination within 1,000 feet of any of the public supply wells; said ordinance to be approved by the Secretary of the State Board of Health before its passage; and,

4th. That this approval be void unless the proposed supply shall have been installed prior to January 1st, 1914.

EXAMINATION OF WATER FROM WORTHINGTON.

PARTS PER MILLION.

Sample Number.	Collected.	Color.	Turbidity.	Sediment.	Odor.	Oxygen Required.	Nitrogen as			
							Albuminoid Ammonia.	Free Ammonia.	Nitrites.	Nitrates.
11357	1912 Apr. 25	0	6	vy. slight	none	.1	.014	.004	.0004	.4
11356	Apr. 25	0	none	trace	none	.1	.026	.002	.0004	1.4

Sample Number.	Chlorine.	Alkalinity.	Incrustants.	Sulphates.	Residue on Evaporation.		Iron.	Bacteria.	
					Total.	Loss on Ignition.		Number per cc.	Colon Present.
11357	7.	256.	72.5	.....	443	49	.1	50	Not in 10 cc.
11356	7.	256.	67.5	.....	419	67	.3	6	Not in 10 cc.

Source of Samples.

Number.

11357. Test well No. 1 on school property. Well 47 feet deep in gravel.
 11356. Private drilled well at residence of Mr. Burkhead on South St. near river. Well 35 feet deep.

REPORT ON PROPOSED IMPROVEMENT AND ENLARGEMENT OF WATER PURIFICATION PLANT AT YOUNGSTOWN.

On June 20th, 1912, there were received from Mr. F. M. Lillie, city engineer, plans showing the proposed improvement and enlargement of the water purification plant at Youngstown. On July 16th, 1912, revised plans embracing minor changes in design were received. On July 10th, 1912, a request for approval of the plans was received from the director of public service. On July 11th, 1912, the chief engineer visited Youngstown and made an examination of the existing plant and proposed improvement. Based on data secured during this examination and previous visits, and on an examination of the plans, the following report was submitted:

Youngstown is located in Mahoning County on the Mahoning River. Its population is approximately 85,000 and the city is growing rapidly. Since 1870 the population has increased from 8,000, with an average percentage increase during each decade of 79.4. The city is largely devoted to manufacturing interests, of which the steel industry is the most important. Owing to its favorable location the future of the city is quite promising.

In the way of municipal improvements Youngstown is provided with a public water supply obtained from the Mahoning River and purified by a mechanical filter plant; a fairly complete system of sewers; and a number of miles of paved streets.

RESUME OF PREVIOUS INVESTIGATIONS BY THE CITY.

The first water supply of the city was installed in 1872 and until 1904 the supply was drawn from the Mahoning River without purification. During this period there prevailed a high typhoid fever death rate, a portion of which at least was attributed to the poor quality of the water supply. During this time, however, the water supply was used by a relatively small portion of the population and private wells were quite largely depended on. These were also in many cases the direct cause of typhoid fever.

On account of the unsatisfactory quality of the public water supply, the city had several reports made upon an improved water supply by consulting engineers. The first report was made in 1899, and the last report, which was adopted by the city, was submitted in 1903. Two of the consulting engineers' reports, namely, that of Messrs. Snow and Barbour in 1899, and that of Mr. George W. Fuller in 1903, are in the files of the State Board of Health and their salient points will be briefly reviewed.

Report of Snow and Barbour in 1899. This report took up a study of available sources of water supply including the Mahoning River, Mill

Creek, more remote surface supplies, and a ground water supply. The ground water supply was eliminated from consideration on account of inadequate quantity and objectionable quality. The more remote surface supplies were eliminated on account of excessive cost of development. A comparison of the Mahoning River and Mill Creek as possible sources led to the recommendation that the latter stream be adopted as a permanent source. The Mahoning River was eliminated on account of its objectionable quality and insufficient quantity available without storage.

Mill Creek, which was recommended as a new source of water supply, was reported by the engineers to have a watershed area of 82 square miles, and it was stated that the lower portion of the stream near its entrance into the Mahoning River offered advantages for storing large volumes of water. This availability of storage facilities coupled with the general good quality of the supply led to its recommendation. It was also contemplated in the consulting engineers' report to establish a water purification plant at the site of the old pumping station on the bank of the Mahoning River, to which the water could be carried by gravity.

Report of Mr. George W. Fuller in 1903. Mr. Fuller's report briefly reviewed former studies by consulting engineers upon the feasibility of various sources of water supply for the city. His report attacked the water supply problem at Youngstown with the idea of securing an immediate improvement, to be installed as a part of a more extensive improvement to be ultimately provided. His report considered as sources of water supply the Mahoning River, Mill Creek, Meander Creek, Mosquito Creek, and ground water sources, all of which had been previously reported on. Briefly, his report indicated that each of the above mentioned creeks offered opportunity as an ultimate source of water supply, and that the Mahoning River, the then existing source, should serve in that capacity until the water consumption at Youngstown required that a new supply be installed. Some consideration was also given to storage reservoirs in the upper portion of the Mahoning River, and the possibility of the use of the river in this manner was suggested. It was, however, stated definitely that the Mahoning River without storage reservoirs could not be considered as a permanent source of supply, and that it was reasonable to suppose that the quantity available from the stream would serve the city until about 1914.

Mr. Fuller's report recommended that the Mahoning River be temporarily continued in use as a source of water supply for Youngstown with the installation of a mechanical filter plant of 10,000,000 gallons capacity to purify the supply. In the general conclusions of his report he recognized that the Mahoning River could serve the needs of the city for only twelve years without constructing large storage reservoirs. It was recommended that before expending large sums for developing reservoirs, future investigations should be made of procuring a suitable

reservoir site on Mill Creek and also of the practicability of building reservoirs on the Mahoning River above Newton Falls.

In order to expedite the improvement of the supply at Youngstown, it was recommended that the purification plant be located near the old pumping station, to which point the water from any of the supplies considered could be conducted by gravity. It was thought that by this means a purification plant could be established within one year and could be placed in operation before thoroughly studying the available permanent sources of water supply.

ACTIONS OF THE STATE BOARD OF HEALTH.

In September, 1899, the State Board of Health considered the report of Messrs. Snow and Barbour on a new water supply for Youngstown and approved the plans as set forth in the following communication to the water works trustees, September 23rd, 1899:

"The State Board of Health has considered your request for the approval of plans, prepared by Messrs. Snow and Barbour, Engineers, for a new source of water supply for your city. The plans provide briefly for impounding the waters of Mill creek and purifying them by means of mechanical filters.

We wish to officially commend the action of your board in planning to abandon the present water supply from the Mahoning river, and for the care that has been exercised in giving a proper study to the question of securing a new supply that will be satisfactory.

The State Board of Health considers that the use of the unpurified Mahoning river water is a constant menace to the health of the citizens of Youngstown, and has officially condemned that supply. The plans proposed for a new supply have been submitted to the Board, and you are hereby notified that they have been approved, subject to the following conditions:

a. That the stored waters of Mill creek shall not be used as a source of public water supply without adequate purification.

b. That the purification plant shall show, during a reasonable trial period, a bacterial efficiency of 98% removal without the appearance of alum in the filtered water; such tests to be made as the State Board of Health may require.

c. That a chemical and bacteriological laboratory be made a part of the plant and that the filtered water be properly examined daily so long as Mill creek is made use of as a public water supply."

Following this approval, however, the city did not proceed to carry out the plans, and after the report of Mr. George W. Fuller had been made, the city engineer was instructed to prepare plans in accordance with Mr. Fuller's recommendations. Plans and specifications for a mechanical filter plant were presented by Mr. F. M. Lillie, city engineer, on January 20th, 1904, and were subsequently approved by the Board as set forth in the following communication addressed to the city engineer, May 4th, 1904:

"The State Board of Health has considered plans presented by you for a gravity filtration plant for the city of Youngstown, for the purification of water to be taken from the Mahoning River near the present pumping station.

You are hereby notified that said Board, at a meeting held April 27th, 1904 voted to approve said plans subject to the following conditions:

1. That any changes made in the plans presented be submitted to and approved by the State Board of Health prior to the construction of the filters.
2. That the purification plant shall show during a reasonable trial period a bacterial efficiency not less than that called for on pages 3 and 4 of the copy of specifications filed with the plans.
3. That a chemical and bacteriological laboratory be made a part of the plant and the filtered water be properly examined daily so long as the Mahoning River is made use of as a public water supply for the city."

In October, 1904, changes in the plans of the strainer system were approved as follows:

"The State Board of Health, at a meeting held October 20th, 1904, considered your application for approval of a change in the design of the strainer system at the Youngstown filter, said system to contain only one set of pipes to be used for both air and water alternately, instead of two sets of pipes as previously proposed."

"You are hereby notified that this change was approved."

The purification plant was installed in 1904 and 1905 and has been in constant operation since that time. During the past few years examinations by the State Board of Health have shown that the plant is seriously overworked on account of the increased consumption and also due to the poor quality of the raw water. The Board has, therefore, at various times through its Secretary urged improvement of the supply.

PRESENT WATER SUPPLY.

The water supply of Youngstown and the purification plant are described in the special Report on Water and Sewage Purification in Ohio, 1908. The water supply is taken from the Mahoning River in the central portion of the city and after passing through a mechanical filter plant is pumped to the distribution system. The Mahoning River is a stream with a watershed area of about 960 square miles which contains a population of about 94,000, equivalent to 98 per square mile. The population is divided into 48,000 urban population in communities of 2,500 or more, and 46,000 rural population. Immediately above Youngstown the watershed is thickly populated and the stream is contaminated by sewage from various cities along its banks. Within the city of Youngstown the Mahoning River receives sewage pollution as well as wastes from several steel mills. In 1903 it was stated by Mr. Fuller that the dirty appearance of the stream was due more to manufacturing wastes than to sewage pollution. This may still be the case, although it must be admitted that the extent of sewage pollution places a heavy burden upon the water purification plant. The flow of the Mahoning River at times becomes very small and in extreme conditions almost the entire flow is required for municipal water supply purposes. With the increasing growth of the city, it does not

seem possible to maintain the Mahoning River as a water supply without extensive storage.

The flow of the Mahoning River is used principally to supply water for industrial purposes at the numerous steel mills located along its banks. It has been roughly estimated that 300 million gallons daily are pumped from the river for cooling and condensing purposes. The water is returned to the stream after it has been used and is repumped at a point farther downstream. The continuous use of the water in this manner raises its temperature greatly and introduces iron and other foreign constituents in objectionable amounts. A large part of this use of the river takes place above the water works intake and thus the quality of the water supply is affected.

Purification Works. The purification works installed in 1905, remain in service as originally constructed. The plant consists of a low lift pumping station, devices for applying coagulant to the raw water, coagulating and sedimentation basins, mechanical filters, and a clear well. Alum is applied as a coagulant to the raw water as it is discharged from the low lift centrifugal pumps. It may be noted that large quantities of alum have been frequently required on account of the excessive pollution of the raw water and the large quantities of suspended matter carried at times. The sedimentation and coagulating basins have a total capacity of 1.2 million gallons, equivalent to three hours flow on the basis of 10,000,000 gallons per day. The filters are of concrete construction, rectangular in plan, each with a nominal capacity of 833,000 gallons when operated at the rate of 125,000,000 gallons per acre per day. Twelve units of this size are provided to furnish a nominal capacity of 10,000,000 gallons. The filters are not provided with loss of head gages or controlling apparatus. The filtered water is conveyed to a circular covered clear well 84 feet in diameter by 24 feet deep, storing 665,000 gallons or about 1½ hours supply when the plant is operated at its nominal capacity.

Various difficulties have been encountered in the operation of the Youngstown plant and these have been partly due to the extremely objectionable character of the raw water, and also partly due to the design of the plant. Alum as a coagulant has been satisfactory during the greater portion of the year, but at times has failed to clarify the river water without the appearance of undecomposed coagulant in the filtered water. The absorption of the alum by the suspended matter has at times been great and the coagulant cost has, therefore, been excessive. Furthermore, the sedimentation and coagulating basins are of too small capacity to provide sufficient clarification of the water, and the filters have been called upon to produce an unnecessarily large portion of the total efficiency of the plant. The filters themselves have for some time been in a poor condition to properly purify the settled water. The filtering material has numerous dead areas and the washing is not efficient.

It is possible also that some of the strainers have become corroded or displaced and have thus interfered with the uniform operation of the filters. In spite of these disadvantages the plant has been operated constantly and has produced fair results.

The capacity of the present plant to furnish the water required by the city is totally inadequate and for the past year or so it has been necessary frequently to operate it at excessive rates to supply the consumption. An examination of records of operation furnished to the State Board of Health revealed the fact that during 1911 the average quantity of water filtered was 11,000,000 gallons per day, or 10 per cent in excess of the nominal capacity of the plant. It is evident that an enlargement of the plant is immediately necessary.

PROPOSED IMPROVEMENT AND ENLARGEMENT OF WATER PURIFICATION PLANT.

The plans for the improvement of the water purification plant provide for increasing its normal capacity to 17.5 million gallons per day but contain no provision for a change in the source of supply, which will be obtained as before from the Mahoning River. In a communication received from the director of public service on July 15th, 1912, it is stated that the city has definitely committed itself to the construction of a large storage reservoir in Milton Township on the Mahoning River above Newton Falls, to be used in maintaining the flow of the river in dry times. As soon as this reservoir is in operation it is intended to extend the water works intake above the worst sources of pollution. It is also stated that it will be possible to build a conduit from the storage reservoir to the water purification works if this should be deemed advisable in the future. The purchase of the land for the reservoir was made possible by a resolution adopted by the council on March 28th, 1910, and at the present time, practically the entire area required has been purchased. It should be noted that this proposition has not been submitted to the State Board of Health for approval, and that it will be necessary that detailed plans of the reservoir as well as of the proposed extension of the intake be submitted to the Board.

The plans for improving the water purification plant provide for abandoning the present coagulating and sedimentation basins and substituting therefor primary sedimentation basins and coagulating basins for the preparation of the raw water before applying it to the filters. The plans also provide for the enlargement of the filtering capacity by the installation of eight additional filter units in the old coagulating and sedimentation basins. The space beneath these new filter units as well as the remaining portion of the old basins will be used as a clear well for the storage of the filtered water. In order to clearly state in what way the proposed enlargement will improve the plant, a brief description will be given.

Primary Sedimentation Basins. The primary sedimentation basins, which will be placed in the same structure with the proposed coagulating basins, are to be built of concrete, the walls being reinforced and buttressed at intervals of 10 feet. Each basin is 200 feet in length by 120 feet in width and has an average depth of 19 feet. Longitudinal baffles separate the basins into three compartments, each 200 feet long by 40 feet wide, thus providing a length of flow of 600 feet. The capacity of each primary sedimentation basin is 3.4 million gallons, the total capacity for the two basins being equal to 9.3 hours' flow when the plant is operated at its ultimate capacity of 17.5 million gallons per day. The raw water will enter the basins with little or no chemical treatment, and the heavier suspended solids will be removed by the effect of plain sedimentation. The raw water is introduced at the end of one of the compartments of each basin through a specially-constructed inlet at mid-depth. The effluent from the basins will flow over broad weirs into a mixing box at one end of the coagulating basins. As it enters the mixing box the water will be treated with the coagulating chemicals. For the purpose of cleaning the sedimentation basins, a sludge drain is provided in each compartment of each basin. The drains are placed at one end of the basins, to which point the floors are sloped.

Coagulating Basins. Two coagulating basins adjoining the primary sedimentation basins are to be provided. Each is to be 200 feet in length, 30 feet in width, and 19 feet in average depth. The water after its thorough mixing will flow the length of the coagulating basin, passing over broad-crested weirs into covered concrete channels conveying it to the filters. No baffles are provided in the coagulating basins to distribute the flow and provide uniform displacement. To remove the sludge from the coagulating basins the floors slope to a 24-inch sewer leaving the basins near the outlet end. The desirability of draining the basins from the inlet end or from the central portion should be recognized. The capacity of the coagulating basins is 855,000 gallons each, the total capacity representing 2.3 hours' period of flow when the plant is operating at its ultimate capacity. While this period is short, the availability of the primary sedimentation basins for use as coagulating basins must be recognized.

Additional Filters. The additional filters to be constructed in the old coagulating basins are designed similarly to the filters at present in use. The filters will be of concrete construction and supported upon columns resting upon the floors of the coagulating basins. Eight additional units will be installed at the present time by the utilization of the space occupied at present by one of the coagulating basins. Space for eight additional units will thus be left available for future use. The design of the filters provides units 326 square feet in area. The total is therefore 2,600 square feet, providing an additional capacity of 7.5 million gallons per day. This will bring the total filtering capacity of the plant to 17.5 million gallons per day. The filtering material, as shown on the plans, is

to consist of 9 inches of gravel covering the strainer system, supporting 3 feet of filter sand. The strainer system will consist of $1\frac{1}{2}$ -inch pipes extending across the filter, placed at 6-inch intervals and drilled with $\frac{3}{8}$ -inch holes. This system of strainers will be connected to two lines of 8-inch cast iron pipe connected with the main effluent piping. The gutters for the removal of wash water are to be placed in two lines lengthwise of the filter and connected to a 12-inch sewer line. The tops of the wash water gutters are to be placed 18 inches above the sand, which is 3 inches higher than in the existing units. Wash water troughs are 13 inches in width and 18 inches in depth, being of somewhat greater capacity than the troughs in the existing units. Air piping connections with the strainer system are provided to make possible air agitation in connection with the washing of the filters.

Pipe Gallery. The design of the pipe gallery for the additional units is substantially the same as that for the old portion of the plant. The floor of the gallery is to be placed about two feet lower than that of the old installation, and thus greater facility for inspection and repair of the piping and controlling apparatus will be provided. The general arrangement of the pipe gallery, however, is objectionable, but this is necessitated by the small space available.

Filter Control. The plans show no details as to the type of loss of head gauges and rate controllers to be used, although the specifications provide for their installation. It is of the utmost importance that these devices be provided and that their proper operation be assured. Plans for this portion of the plant should be submitted to the Board.

Clear Well. Additional clear well capacity will be provided by utilizing the present coagulating basins. By this means an additional storage of filtered water of 1.5 million gallons will be possible. This will bring the total storage to 1,165,000 gallons, equivalent to 1.4 hours' storage. A portion of the clear well, not covered by the proposed filters, is not provided with a cover, and the clear water will therefore be subject to the danger of contamination. A cover should be provided.

SUMMARY.

From the foregoing report it will be seen that the existing water purification plant at Youngstown has become inadequate to supply the water needed by the city. The inadequacy of the plant together with the poor quality of water which it has to treat, has caused its deterioration and inability to produce at all times a satisfactory effluent. It is believed that the design for the enlargement of the plant will improve conditions to the extent of providing means for purifying a large quantity of water from the Mahoning River.

It is the intention of the city to continue the Mahoning River as a source of supply, and to increase the available quantity by the construction of a large storage reservoir above Newton Falls. It is also intended

to extend the intake upstream from the city above local pollution. Ultimately the intake conduit should be extended to the proposed storage reservoir to avoid sewage contamination from cities and villages between the reservoir and the city of Youngstown. Plans for the proposed reservoir and proposed extension of the intake must be acted on by the Board, at which time the question of the ultimate extension of the intake to the proposed reservoir may be considered.

ACTION OF THE BOARD.

Request for approval having been received from Mr. Veeder Heasley, director of public service, on July 10th, 1910, the State Board of Health at a meeting held August 15th, 1912, approved the revised plans for a proposed improvement and enlargement of the water purification plant at Youngstown, received July 16th, 1912, from Mr. F. M. Lillie, city engineer, subject to the following conditions:

1st. That samples of the filtering material be submitted to and approved by the engineer of the State Board of Health before being placed;

2nd. That the design of the coagulating basins be revised satisfactorily to the engineer of the State Board of Health by the provision of baffles to distribute the flow and provide uniform displacements;

3rd. That loss of head gages and controlling apparatus be installed for the new filters as well as for the old units, and that detailed plans of these features be submitted to and approved by the engineer of the State Board of Health;

4th. That that portion of the proposed new clear well which includes the westerly half of the present coagulating basin, be provided with a substantial cover;

5th. That complete revised specifications of the proposed improvement be submitted to the State Board of Health;*

6th. That the city provide for analytical control of the plant by the employment of a competent analyst and superintendent to be regularly in charge of the operation of the plant;

7th. That as soon as the proposed enlargement shall have been completed, the existing filters be completely overhauled and placed in perfect working condition;

8th. That the plant be altered, repaired, or enlarged and that the method of its operation be modified, when required by the State Board of Health; and

9th. That this approval be considered void unless contracts for the installation shall have been awarded prior to January 1st, 1913.

The attention of the authorities was called to the necessity of submitting to the State Board of Health for approval, plans for the improvement of the water supply contemplated by the installation of a storage reservoir on the Mahoning River above Newton Falls and by the extension of the water works intake above local sources of pollution.

* Rec. August 22nd, 1912.

REPORT ON PROPOSED NEW WATER SUPPLY FOR
ZANESVILLE.

On October 29th, 1912, plans and specifications for a proposed new water supply for Zanesville, prepared by Messrs. Hering and Gregory of New York City, consulting engineers for the city, were submitted by Mr. E. A. Evans, director of public service. These plans were reviewed by the engineering department and based upon this review and numerous previous visits, the following report was submitted:

Zanesville is located in Muskingum County on the Muskingum River at its confluence with the Licking River. The city has a population of approximately 30,000, and is experiencing a steady but not rapid growth. Owing to its good railroad facilities it is an important manufacturing center and has a number of large clay industries in addition to several plants devoted to the steel industry. The topography of the central portion of the city is level, as this portion is situated upon the flat plain of the Muskingum River. The outlying portions are, however, very hilly. The city is well provided with municipal improvements, including a public water supply, a fairly complete system of sewers, and numerous paved streets. The sewers have been built on the combined plan and discharge through numerous outlets into the Muskingum River. Several of these outlets are above the Government dam, which is immediately above the mouth of the Licking River, and these contribute to the pollution of the water impounded by the dam; thus the water supply is affected by the sewage of the city.

INSTALLATION OF WATER SUPPLY AND ACTIONS OF STATE BOARD OF HEALTH.

The first public water supply of Zanesville was installed in 1840. At this time the water was taken from the Muskingum River at a point near the east branch of the stream opposite the central portion of the city. This intake was used until 1873, in which year a new pumping station and intake were installed in the extreme northerly portion of the city. This change was made to avoid the constantly increasing contamination of the supply. No radical changes in the method of obtaining the supply have been made since 1873, and at the present time the supply is pumped from the Muskingum River without treatment.

Owing to the unsatisfactory quality of the raw water from the Muskingum River, it has been the general desire upon the part of the inhabitants to secure an improved supply. The project received an impetus in 1899 and in that year the State Board of Health was requested to approve a new water supply to be derived from wells. In January 1900, the Board approved a new water supply to be derived from wells in the northerly part of the city on the west side of the Muskingum River. Subsequently this project was abandoned.

In 1904 the Board was asked to approve of a proposed new water supply to be derived from wells located on the east side of the river and to the northward of the city. The proposed site comprised the tract now known as the Hague Farm. In July 1904, this supply was approved with a recommendation that the new pumping station be designed as a part of a future filter plant to be constructed in case the wells failed and it became necessary to resort to the river water. Subsequent to this approval the new water supply was not installed.

In 1908 the local officials again revived the campaign for a new water supply, and the State Board of Health was asked to make several examinations relative to a new supply to be obtained from wells on the Hague Farm. The results of these investigations were furnished to the local officials but nothing further was accomplished to secure a new water supply.

During the past year or so the agitation for a new supply was again revived and the city has received engineering advice from several experts. Messrs. Johnson and Fuller of New York City recommended the installation of a mechanical filter plant to purify the water obtained from the Muskingum River. This recommendation was, however, not followed owing to a widespread desire upon the part of the inhabitants of the city for the installation of a well supply.

PRESENT WATER SUPPLY.

At the present time the water supply is pumped from the Muskingum River without treatment, the intake being located one-half mile south of the northerly corporation line of the city on the east bank of the river. The water is pumped into an intermediate service reservoir from which it flows by gravity into a low service reservoir, and into a standpipe which furnishes storage and pressure for the high service district. The pumping equipment of the present installation is greatly depreciated and in a poor state of repair. Its entire abandonment will not cause a serious financial loss.

The Muskingum River from which the water supply is taken has a watershed area above Zanesville of 5850 square miles, upon which there is a population of approximately 470,000, or 80 per square mile. The topography of the watershed is somewhat hilly and the stream is turbid a large part of the time. The sewage pollution which reaches the stream is of rather large amount as there are some twenty municipalities upon the watershed which are sewered. The quality of the supply is unquestionably bad and purification is required to make the water satisfactory for general purposes.

PROPOSED NEW WATER SUPPLY.

In the improvement of the water supply at Zanesville, two possible methods of procedure may be followed, namely, the abandonment of

the Muskingum River as a source and the installation of a ground water source, and the continuance of the Muskingum River as a source with the installation of a water purification plant. The advantages to be gained by the adoption of a well system consist in obtaining a water of good hygienic quality without cost of treatment, and the disadvantages include the objection which is caused by the unsatisfactory mineral characteristics of the water. Also the question of quantity is to be considered and must be taken as an uncertain factor. The advantages in a water supply obtained from the Muskingum River relate to its abundant and permanent quantity and its satisfactory quality from the standpoint of its mineral content. Its disadvantage lies in its unsatisfactory hygienic quality which may be corrected at the cost of installing and operating a purification works. The relative value of these two sources of supply can only be judged by extensive studies based upon statistics obtained from experiences in the use of numerous supplies.

The plans of the consulting engineer provide for the installation of a new supply to be obtained from drilled wells located on the Hague Farm, so-called, in the valley of and immediately east of the Muskingum River. The improvement in general will comprise the installation of wells, the erection of a new pumping station, provision for modern pumping equipment, and connection to the existing mains. The abandonment of the existing pumping station and intake will be made possible and in view of the danger attached to emergency intakes, its abandonment should be provided by the Board.

Site. The proposed location for the new supply is a tract 40 acres in area, owned by the city of Zanesville, situated on the east bank of the Muskingum River immediately north of the northerly corporation line of the city. It is a level tract of land 3,000 feet in length lying between the river and the steep hills at the side of the valley and has a width varying from 270 feet at its southerly line to 1,000 feet at its northerly line. It is suitably located as regards the sanitary conditions of its surroundings as there are no visible influences which might affect the sanitary quality of the supply.

Wells. The plans provide for the drilling of twenty wells, more or less, as appear desirable. The wells will be drilled to an average depth of 62 feet and will penetrate approximately the following formations: loam and clay, 3 feet; hard yellow clay, 7 feet; coarse waterbearing sand, 8 feet; impervious yellow clay, 20 feet; waterbearing sand and gravel, 26 feet; underlain by rock. The water is obtained from the sand and gravel formation and rises under ordinary conditions to an elevation about 10 feet below the surface, or approximately 2 feet below the normal level of the Muskingum River. The wells will be cased with 10-inch galvanized wrought iron pipe to a point 16 feet from the bottom of the wells, where a brass strainer will be placed.

It is proposed to pump the wells by air lift, and the plans of the consulting engineers provide for the installation of well vaults or basins to receive the discharge at the top of each well. These will be constructed of concrete, will be circular in plan, 5 feet in diameter, and the tops will be carried to an elevation 5.8 feet above extreme high water elevation of the Muskingum River. The vaults will be surrounded by earth embankments at a 1 on $1\frac{1}{2}$ slope, extending to an elevation about one foot below the tops of the cisterns. An overflow from the vaults will be placed at an elevation 4 feet above extreme high water. The design of the vaults is such as to provide removal of sand and air from the water without exposure of the supply to the danger of contamination. Eight-inch cast iron pipes will convey the water from the cisterns to a main conduit leading to the clear water reservoir.

The exact number of wells to be drilled will be determined by testing the wells as they are installed. The specifications provide that each individual well shall be pumped continuously for 24 hours after its completion and the volume of water discharged accurately measured. Additional pumping for 48 hours may also be carried on at the discretion of the engineer in charge of construction. In addition it is proposed that a group of four 10-inch wells shall be tested simultaneously to determine the availability of the supply. In addition to the measurement of the quantity pumped from the four wells, which is specified at not less than three million gallons per 24 hours, observations will be taken, by means of $1\frac{1}{2}$ inch wells, to learn the effect upon the general ground water level at distances reaching one mile. The results of such tests will give an indication of the available yield, but will not give conclusive evidence.

Quality of Water. The quality of the water supply obtainable from the proposed source is demonstrated by the results of analyses of samples collected during 1904 and 1908. The results of the analyses are appended. In 1904 samples were taken from test wells Nos. 1, 2, and 3 on the Hague Farm. In 1908 samples were taken from test wells Nos. 1, 2, and 5. The analyses of all of the samples indicate that the water is of an entirely satisfactory quality from a hygienic standpoint. The physical characteristics of some of the samples were objectionable, due no doubt to the newness of the wells. In certain of the samples, however, the physical characteristics are all that might be desired. The quality of the water from the standpoint of its mineral content is unsatisfactory and this is particularly true as regards the hardness. The iron content in the various samples fluctuates, but it is apparent that considerable iron is likely to be contained in the water drawn from wells at the proposed location. Continued pumping may reduce this constituent. The excessive hardness is the principal objection to the proposed supply. The average of all of the samples indicates 203 parts per million alkalinity, and 94 parts per million incrustants, making a total hardness content

of 297 parts per million. This will cause considerable complaint, especially as the incrusting constituents form such an appreciable percentage of the whole.

Considering the hardness of the proposed supply it is pertinent to note that the present supply from the Muskingum River has an average total hardness, as demonstrated by the source of samples collected during 1899 and 1903, of 211 parts per million. This is composed of alkalinity of 168 parts, and incrustants 43 parts. It will be noted that this is considerably lower than the hardness of the proposed supply and it may be expected that considerable complaint will ensue as a result of changing from a moderately hard to an excessively hard supply. It may also be noted that the water supply of Columbus before its treatment has an average hardness of 223 parts per million, composed of 153 parts of alkalinity and 70 parts of incrustants. This supply is considered too hard in its natural state and is softened so that the average total hardness content is 87 parts per million, composed of 45 parts of alkalinity and 42 parts of incrustants. It will be observed that the resultant incrustants content is practically the same as the average incrustants content of the Muskingum River.

Clear Water Reservoir. The water pumped in the wells will flow through gravity cast iron conduits to a clear water reservoir provided for storage. This is a rectangular reinforced concrete structure covered with a concrete roof of groined arch construction, which will in turn be covered with a layer of earth. The reservoir has a total net capacity of 1,000,000 gallons and is divided into two compartments, each 80 feet 4 inches square and 11 feet deep to the flow line. The overflow from the reservoir will take place through a 24-inch pipe discharging through a hinged flap valve. It should be noted that the flow line in the reservoir is 2.2 feet below extreme high water of the Muskingum River and the elevation of the overflow is 2 feet below extreme high water. A leak even of small volume through the flap valve would, therefore, seriously endanger the supply. A gate valve should be installed in the overflow line, to be closed in emergency when the river is at extreme high stage. The plans provide no means of draining or cleaning the reservoir. Owing to the mineral characteristics of the water it may be expected that rather heavy iron deposits will form in the reservoir which will require removal. A drain should be provided for this purpose.

Pumping Station. The pumping station and equipment will be of modern design and will be equipped with devices for the economical handling of coal, ashes and machinery. The air for the pumping of the wells will be supplied by two air compressors, each having a capacity of 2500 cubic feet of free air compressed to gauge pressure of 30 pounds per square inch. The water will be pumped into the mains through three turbine driven centrifugal pumps, each having a capacity of 6,000,000

gallons per 24 hours. One of these is provided for the low service, one for the high service, and the other unit may be used for either service. Steam for the operation of the pumps will be provided by four water tube boilers of 300 horsepower each. Sanitary conveniences will be provided for the employes and a sewer is proposed to discharge into the Muskingum River about 300 feet downstream from the pumping station.

Provision for Possible Purification Works. Should the proposed supply become inadequate in quantity, or should it be desired to improve its quality, purification works either to improve the hygienic quality of the river water, or the mineral quality of the well water may be installed and connected to the proposed new installation. In arranging the location of the wells, ample provision is left for the installation of a gravity mechanical filter plant, to be used in case the river shall become the source of supply, or a water softening plant, to be used to improve the quality of the well supply.

SUMMARY.

From the foregoing report it will be noted that the existing water supply of Zanesville is of entirely unsatisfactory quality, and is dangerous as a supply for general purposes. Since 1899 various attempts have been made to secure an improved supply, and in that year as well as in 1904, the State Board of Health was asked to approve a proposed new supply to be obtained from wells. In each case the Board granted its approval. The question of a filtered supply obtained from the Muskingum River has also been considered, but popular objection to a filtered supply has prevented its adoption.

The supply now proposed is the same as that approved by the Board in 1904. At the present time, however, there are presented complete detailed plans for the development of the supply. In regard to the proposed source of supply, it may be said that the available quantity is uncertain and that it will be necessary to conduct exhaustive tests to obtain an indication of the permanency of the supply. The results of such tests, however, will not furnish conclusive proof. The quality of the proposed supply is satisfactory from a hygienic standpoint and with reasonable protection of the wells will remain so. It is unsatisfactory, however, due to its chemical characteristics, and the hardness and iron content may be expected to give rise to general complaint. The plans of the consulting engineers for the development of the proposed supply are in general satisfactory, and provide for a modern and well equipped installation. The details of the clear water reservoir should be changed by providing a drain for cleaning and a gate valve in the overflow pipe to safeguard the quality of the water during extreme high stages of the river.

ACTION OF THE BOARD.

At a special meeting held in Cincinnati November 5th, 1912, the State Board of Health considered the proposed new water supply for Zanesville, to be developed according to plans prepared by Messrs. Hering and Gregory of New York City, consulting engineers, and submitted by Mr. E. A. Evans, director of public service, October 29th, 1912.

A report of the chief engineer was presented for consideration by the Board with the following recommendations:

1st. That the city council pass an ordinance and file a certified copy of the same with the State Board of Health, preventing the establishment of any privy vault, cesspool or other source of pollution within 500 feet of any of the wells; said ordinance to be approved by the Secretary of the State Board of Health before its passage;

2nd. That the State Board of Health be furnished with the results of tests for quantity of the proposed supply, provided in the consulting engineers' specifications, before contracts for the installation of the pumping station and machinery shall have been awarded.

3rd. That the design of the overflow from the clear water reservoir be revised by providing a gate valve in addition to the flap valve shown on the plans.

4th. That immediately following the installation of the proposed new supply the existing water supply and pumping station be entirely abandoned and disconnected from the distribution system; or, that if the existing installation be maintained as an emergency supply its use shall be subject to the control of the health officer of the city of Zanesville, and that the city council pass an ordinance and file a certified copy of the same with the Secretary of the State Board of Health containing the following provisions:

(a) Authorizing and ordering the director of public service to provide the local health officer with equipment for placing seals upon the valves in the mains connecting the existing pumping station with the distribution system;

(b) Authorizing and directing the local health officer to place seals upon the said valves in such manner that the valves cannot be opened without breaking and destroying the said seals;

(c) Ordering the director of public service or the superintendent of water works to notify the local health officer of the opening of said valves before the valves are opened, if possible, and in any case within one hour after the valves are opened; and directing the local health officer to give general warning to boil all water used for drinking to the inhabitants of the city, immediately upon receiving such notification, and to place a seal upon the valves immediately following the termination of the use of the emergency supply; and

(d) Directing the local health officer to inspect said seals at intervals not greater than thirty days to determine whether they have been broken without his knowledge.

5th. That this approval shall be void unless contracts for the installation of the proposed new supply shall have been awarded prior to March 1st, 1913.

The consulting engineers should be advised that in the opinion of the State Board of Health (1) the design of the overflow from the clear water reservoir should include a gate valve in order to prevent back flow into the reservoir during extreme high stages of the Muskingum River, and (2) that a drain should be provided from the clear water reservoir to make possible the removal of iron deposits and other material which may accumulate at the bottom of the reservoir.

The officials of the city of Zanesville should be advised as follows:

The quality of the proposed new supply to be obtained from wells has been shown to be entirely satisfactory from a hygienic standpoint. Its mineral constituents are, however, objectionable, particularly as regards the hardness and iron. The hardness of the well water is considerably greater than that of the Muskingum River, and it may be anticipated that considerable complaint will arise from the consumers. The permanency of the supply as regards its quantity is not assured and can be indicated but not proven by pumping tests.

The following motion by Mr. Hill, engineering committee, was adopted:

"That the plans of Messrs. Hering and Gregory, consulting engineers, for a proposed new water supply for the city of Zanesville, to be obtained from drilled wells on the Hague farm, situated east of the Muskingum River and immediately north of the city, be and are hereby approved with respect to the Hague farm as a proposed source of supply, provided the directions given Mr. Gregory by the State Board of Health at its meeting held at the Hotel Sinton, Cincinnati, August 15th, 1912, with respect to proper testing out of this source of supply, before contracts are made for anything beyond the necessary test and observation wells, be thoroughly exploited; and, further, that this approval shall not go beyond the approval of the Hague farm as a proposed source of supply and such experimental work as may be required to prove that it is a sufficient source in point of quantity, and shall not be held to include the plans for pumping station, pumping machinery and other features of the work embraced in the plans submitted; and approval to be granted in accordance with the recommendations of the chief engineer submitted at this meeting."

EXAMINATION OF WATER FROM ZANESVILLE.

PARTS PER MILLION.

Sample Number.	Collected.	Color.	Turbidity.	Sediment.	Odor.	Oxygen Required.	Nitrogen as			
							Albuminoid Ammonia.	Free Ammonia.	Nitrites.	Nitrates.
3609	5/ 2/04	9	0			.15	.012	.004	.002	0
3648	5/12/04	10	15			.15	.012	.002	trace	0
3798	7/ 2/04	10	20			1.07	.030	.022	.040	0
3649	5/12/04	17	225			1.70	.056	.530	.450	trace
7586	6/ 2/08	10	5+	trace	earthy	1.40	.028	.020	.002	0
7588	6/ 2/08	0	0	0	0	1.40	.030	.004	.002	0
7619	7/ 1/08	5	trace	none	none	.60	.012	.002	.010	none

Sample Number.	Chlorine.	Alkalinity.	Incrustants.	Sulphates.	Residue on • Evaporation.		Iron.	Bacteria.	
					Total.	Loss on Ignition.		Number per cc.	Colon Present.
3609	2.5	181	40	.....	246	.....	trace	8007	Not in 50 cc.
3648	4.6	222	40	.....	378	.....	.7	.....	
3798	8.9	207	95	.....	392	.....	0	100	Not in 50 cc.
3649	10.4	273	122	.....	472	.....	5.0	.....	
7586	10.8	194	92.5	115	432	48	0.6	11	Not in 50 cc.
7588	9.1	182	75	91	340	38	0.1	45	Not in 50 cc.
7619	18.2	158	140	.....	572	72	0.6	.....	

Source of Samples.

Test wells on the Hague Farm.

Number.

3609. Test well No. 1.
 3648. Test well No. 2.
 3798. Test well No. 2.
 3649. Test well No. 3.
 7586. Test well No. 2.
 7588. Test well No. 1.
 7619. Test well No. 5.

SEWERAGE AND SEWAGE PURIFICATION

(439)

REPORT OF PROPOSED SEWAGE PURIFICATION AND GARBAGE DISPOSAL PLANT FOR AKRON.

On July 8th, 1912, plans for a proposed plant for the disposal of sewage and garbage at Akron were submitted by Mr. Frank W. Rockwell, mayor. Based on an examination of the plans and a review of sewerage conditions at Akron, the following report was submitted:

Akron is a city with a population at the present time of approximately 75,000. It is an important manufacturing center and is growing quite rapidly. The city is located in the valley of the Little Cuyahoga River, just north of the Great Divide, and its topography is quite hilly. The city has been provided with a public water supply which has been operated under private ownership. Recently the water works plant was taken over by the city, and at the present time the construction of an entire new supply is under way. The first sewers of the city were constructed about 1880, being located in the central portion of the city and built to carry both storm water and domestic sewage. The extensions from this first system are principally constructed on the separate plan, and at the present time practically the entire built up portion of the city is provided with sewerage facilities.

PREVIOUS ACTIONS OF THE STATE BOARD OF HEALTH.

Previous to 1907, no proposal for the construction of sewers at Akron had been submitted to the State Board of Health. In January, 1907, the State Board of Health considered plans for a sewer in the Cuyahoga Street district and approved them subject to the condition that the main sewer for this district be constructed at such an elevation as to make possible its continuance in a southerly direction and its discharge into the city sewer system or at sewage purification works. At the same time the Board considered an application for approval of plans for extending the main sewer of Akron, and these plans were disapproved. It was at this time contemplated to construct a large combined sewer, and the Board advised that the dry weather flow be separated from the storm water and conveyed through a suitable trunk sewer to a location satisfactory for sewage purification works. At a meeting of the State Board of Health held June 29th, 1910, the Board considered the question of approval of an outlet for a trunk sewer to be discharged into the Little Cuyahoga River about two miles below the existing outlets. The outlet was approved and the city of Akron was given six months time in which to submit to the State Board of Health a definite method for disposing of its sewage, the understanding being that if such method was approved by the Board, the city should furnish, without delay, plans for a sewage disposal plant. It was stated by the city's consulting engineer at this time that it would be advisable to

experiment to determine the best method of purifying the sewage. At a meeting of the Board held January 25th, 1911, it was voted to grant a reasonable extension of time for the carrying on of experiments and the development of the design proposed for the sewage purification plant. At this time it was stated that the city had purchased a site and appropriated the sum of \$10,000 for testing and experimental purposes. Following this, the city proceeded to construct a sewage testing station, the operation of which was begun about January 1st, 1912. The sewage experiments have been carried on continuously since that time, and it is planned to continue the operation until January 1st, 1913.

PRELIMINARY CONFERENCES AND ACTIONS OF THE BOARD REGARDING
PROPOSED SEWAGE PURIFICATION AND GARBAGE DISPOSAL.

On April 18th, 1912, Mr. C. D. Crouch of Chicago, president of the Public Service Finance Corporation, conferred with the chief engineer regarding a proposed scheme for disposing of the sewage, garbage, and other municipal wastes of Akron by the so-called Hopcroft-Matlack process. He was informed that no action of the State Board of Health could be secured until the plan had been presented by the proper city authorities. On May 3rd, 1912, a set of preliminary plans for a sewage purification and garbage disposal plant was submitted, accompanied by a resolution of the board of control requesting approval of the Hopcroft-Matlock process. These plans were not reported on to the State Board of Health, but at a meeting held May 9th, 1912, the Board "considered the proposed installation of a disposal process for sewage, garbage and night soil at Akron, and action was deferred until such time as the officials of the city present to the Board an application for approval of said process accompanied by a report of some experienced, reliable engineer, who has carefully considered the matter, acting in an independent capacity in behalf of the city of Akron."

On June 13th, 1912, there was received a report by Mr. F. C. Williams of Cleveland, consulting engineer employed by the city. The report, which was brief, insufficiently described the process and did not consider the sewerage situation at Akron. On June 18th, 1912, revised plans of the Hopcroft-Matlack process of sewage and garbage disposal were unofficially submitted to the chief engineer by Mr. Albert F. Matlack, engineer for the Public Service Finance Corporation. The plans were accompanied by the engineer's description of the process. Owing to the fact that these plans were not officially submitted, they were not examined or reported on. At a meeting of the State Board of Health held June 19th, 1912, the report of Mr. F. C. Williams was considered and the director of public service of Akron was informed that "the Board does not consider that this matter has been investigated, on behalf of the city, in as thorough manner as is advisable and instructed its

Secretary to so notify you. Before taking any action in this matter the Board will require that a thorough study of the plans be made by an experienced, reliable engineer with a report entirely favorable to the adoption of the plans by the city of Akron."

On June 30th, 1912, a second report by Mr. F. C. Williams was received, in which the Hopcroft-Matlack process of sewage disposal was endorsed, but no mention was made of the conditions at Akron or the adaptability of the process to these conditions. The report is covered in a brief letter. On July 8th, 1912, a set of plans, which are duplicates of those submitted by Mr. Albert F. Matlack on June 18th, 1912, was officially submitted by Mr. Frank W. Rockwell, mayor, accompanied by a request for approval of the State Board of Health, signed by the mayor. It is upon these plans that this report is based.

PRESENT SEWERAGE.

As has previously been stated, the sewerage of the city of Akron is constructed partially on the combined plan and partially on the separate plan. All but one of the sanitary sewers discharge into a 42-inch circular brick intercepting sewer which conducts the sewage to a point at the northerly edge of the thickly built up portion of the city where it discharges into the Little Cuyahoga River. It has been estimated that the dry weather flow is 10,000,000 gallons per day. Storm water flows directly to the Little Cuyahoga River through numerous overflows. The sewage from the city contains large volumes of wastes from manufacturing industries, and its character is noticeably influenced by these wastes. The chlorine content alone fluctuates from about 300 parts to 3000 parts per million, showing the influence of salt wastes. The exact influence of these wastes on the sewage as relates to the proper method of disposal, is being learned by the extensive experiments which are now being carried on. The discharge of sewage into the Little Cuyahoga River produces offensive conditions, especially during the warmer portions of the year. Aside from the requirements of the State Board of Health relating to the purification of the sewage, the city was made the defendant in a suit instituted during 1910, claiming damages due to the pollution of the Little Cuyahoga River. The court in deciding the case, awarded nominal damages to the complainants but enjoined the city of Akron from discharging unpurified sewage into the Little Cuyahoga River after December 14th, 1910. It will be seen, therefore, that the city is now under court order to install purification works. That the city has proceeded in good faith is shown by the fact that a suitable location has been secured for purification works and provision made for comprehensive experiments to determine the proper method of purifying the sewage.

PROPOSED SEWAGE PURIFICATION AND GARBAGE DISPOSAL PLANT.

The Public Service Finance Corporation is subsidiary to the Sewage and Garbage Power Company of Boston, from which company, it is claimed, the right to use certain patents in the disposal of sewage and garbage has been obtained. The general project of the Public Service Finance Corporation involves the disposal of the sewage and garbage and the utilization of the solids recovered in the production of gas. The fuel thus formed will furnish the means for operating an electric power station. The plans which have been prepared are not in complete working detail and do not show several essential features in the operation of the plant. In brief, the plans provide for the installation of a plant with a capacity of 15,000,000 gallons of sewage and 50 tons of garbage per day, comprising a screen house where the primary treatment of the sewage and garbage will take place; settling tanks for the removal of suspended solids; and percolating filters for the final treatment of the sewage. The disposal of the solid portion is provided for by driers and gas producers, from which the fuel and the resultant ash will be produced.

Site. The proposed location for the plant is a tract of ground purchased by the city a year or more ago for sewage purification purposes. It is situated at the confluence of the Little Cuyahoga and Cuyahoga Rivers, about one-half mile north of the northerly corporation line of the city. This location has been commented upon in previous reports and may be said to be generally satisfactory for sewage purification works of almost any type.

Screen House. The sewage will arrive at the plant through a proposed main intercepting sewer which will be installed to carry the dry weather flow. It should be noted that a portion of the storm water flow will reach the plant following storms, and the plans show no device for deflecting this flow into the stream; presumably it will be carried through the plant. The main sewer passes through the screen house and the sewage is freed of its larger suspended particles by means of a moving screen. The details of the screen are not shown on the plans except for the main dimensions. It will consist of $\frac{1}{2}$ -inch wire rope, placed one inch on centers, supported by angle bars and made in the form of a belt conveyor dipping into the flowing sewage and passing over a pulley at an elevation about 12 feet above the floor line of the screen house. By the operation of the screen, the solids may be carried over the pulley and dropped into a hopper. The plans show insufficient detail of a sprinkler system said to provide for the condensation and dissociation of malodorous gases. The operation of this sprinkler system is not clear and entirely insufficient detail of the design is shown.

The screen house also serves as an unloading station for the garbage delivered from the city. The cars containing the garbage are drawn

along one side of the building and the garbage is dumped into a hopper, from which it falls to a belt conveyer. This conveyor extends to the bottom of the hopper which receives the sewage screenings and is designed to furnish opportunity for hand picking of the garbage to remove rubbish and other foreign matter. The picked garbage will be discharged into the hopper with the sewage screenings. Immediately below the hopper are provided pulverizing rolls, the details of which are not given, designed to crush the garbage and sewage screenings and form a pulp. The operation of this feature is not clear nor is it assured that the material will be finely divided. After passing through the rolls, the material falls directly into the flowing sewage. It should be noted at this point that the object of primary treatment of sewage is to remove the suspended solids. The addition of the garbage pulp will add to the sewage approximately 25 tons per day of wet garbage or $6\frac{1}{4}$ tons of dry material. Adjacent to the pulverizing rolls is to be placed an electrically driven rotary pump to dray off supernatant liquid from the settling tanks, and also to remove the sludge from the tanks and pump it to the storage tanks.

Settling Tanks. From the screen house the sewage passes through a series of concrete flumes to the settling tanks. These tanks are termed the Matlack saprophytic tanks and are claimed by the originator to produce especially efficient results in the sedimentation of the solid particles. The design provides three sets of twin tanks, each of which is separated into two tanks, the latter being further subdivided into ten compartments. The size of each compartment is 30 feet by 30 feet in plan and the depth to the flow line is 10 feet at the walls and 15 feet at the center. The bottom is sloped at this point where a sludge drain is provided. The length of each subdivision of the tanks is 300 feet, and the capacity 76,000 gallons. The total capacity of all of the tanks is therefore about 4,600,000 gallons, which on the basis of the design provides a retention of 7.3 hours. The tanks are to be constructed throughout with concrete and will be covered with a flat concrete roof. Piping is provided to draw off the supernatant liquid in the tanks to a point 7 feet below the flow line. When this is done, the rotary pump before referred to will force the liquid into one of the tanks in service. The sewage enters the first compartment of each of the subdivisions at the flow line and passes to the second compartment through an opening about 2 feet above the bottom of the dividing wall between the compartments. Passing through the second compartment it enters the third over the dividing wall at the flow line, and passes on with an up and down motion through the various compartments of the tanks. The total length of flow thus secured will be about 308 feet, and the velocity of flow will average 0.7 foot per minute when all tanks are in service and receiving 15,000,000 gallons per day. Considering the very large amount of suspended matter which the sewage will contain, especially after the garbage

has been introduced, it does not seem reasonable to suppose that the passage of the sewage through the tanks with the frequently reversed up and down motion will produce a satisfactory degree of sedimentation. This will be especially true when storm flow reaches the plant. A large portion of the solid matters, especially the lighter portions such as will be introduced by the garbage, will no doubt pass through the effluent channel from the tanks. It is proposed to remove the sludge from the various compartments when it appears advisable. This may occur once in twenty-four hours or at less frequent intervals. It is, however, intended to remove the sludge before any putrefaction has begun, as it is claimed that only the fresh sludge is suitable for gas production. The sludge will be drawn off through the rotary pump before referred to and discharged into the sludge storage tanks, where it will remain until it is passed through the gas producers.

Sludge Storage Tanks. No detail of the design of the sludge storage tanks is shown on the plans. It is stated that they will be of steel construction, each to hold one day's supply. The plans show two cylindrical tanks of indefinite dimensions.

Filters. The effluent from the settling tanks flows through a series of concrete channels provided to convey the sewage to the various filter units. The design provides 16 square filter beds, each with an area of slightly more than one acre. The floors and walls of the filters will be constructed entirely of concrete, and the dividing walls or end walls, as the case may be, are to be used to convey the sewage to the filters. The total area of the filters provided is about 16.5 acres, which at nominal capacity of the plant provides a rate of 0.9 million gallons per acre per day. The filtering material proposed consists of seven separate layers, each about one foot in thickness, made up from the surface to the bottom as follows: Medium crushed stone, coarse clinker, coarse slag, brickbats, coarse clinker, coarse slag, coarse clinker.

The size of the various classes of material is not given, but apparently the coarsest material is to be placed at mid-depth and will be superimposed and underlaid by a material of finer grade. It should be noted that this method of placing the material will increase its tendency to clog. The design provides for the distribution of the sewage through 5-inch vitrified pipe lines laid at a depth of one foot below the surface. Six feet of the filtering material will therefore be effective. The pipe lines connect to the distributing channels at five feet on centers and extend the full width of the bed. The joints are to be sealed and the sewage is to be applied to the filtering material through 5/32-inch holes placed 2 or 3 inches on centers. The sewage will discharge through these openings at little or no head, and it will readily be seen that the tendency to clog will be very great. This is especially true as the sedimentation effected in the tanks will not be satisfactory. The under-drainage of the bed is provided by channels following the slope of the

floor to a main drain extending along one side of each filter. The channels are formed by bricks set on edge and covered with split tile. The placing of such underdrains will be extremely difficult and the dumping of the filtering material will probably dislodge the underdrains and cause the stoppage of the channels. This will prevent aeration and drainage of the bed. The principal points of objection to the design of the filters include an improper method of distribution of the sewage, an unsatisfactory selection of filtering material, and an ill-chosen design of the underdrainage system. Any of these three features will interfere with the proper operation of the filters.

The effluent from the filters is to be carried through several outlets discharging into the Cuyahoga and Little Cuyahoga Rivers. It is customary in the use of percolating filters to provide final sedimentation basins to remove from the effluent large quantities of suspended matter contained. The suspended matter is to be expected in the effluent if the filter is in proper working condition. If it is not present, it is an indication that the filter is becoming clogged, in which case the filter itself will fail to give satisfactory results. The suspended matter is usually not putrefactive, although at times when the operation of the plant is not efficient it may be of a very offensive nature. It is quite generally conceded that a percolating filter installation is not complete without the final sedimentation feature.

Sludge Disposal. From the sludge storage tanks the sludge will be pumped to filter presses located in the gas producer house. Assuming the recovery of 5 cubic yards of wet sludge per million gallons of sewage and the receipt of 25 tons of garbage per day, the solids will consist of sewage sludge and garbage pulp in the proportion of about 1 to 1. It is estimated that it will contain 90 per cent. moisture, and that this may be reduced to 55 per cent. by filter pressing. It should be noted that European and American practice have shown the futility of attempting to reduce the percentage of moisture below about 67. The liquor from the presses will be conveyed to the sewage as it reaches the plant. The sludge cakes or cheeses will be elevated to a storage bin and put through a small disintegrator which breaks the cakes into small particles and feeds the material into a hopper at the top of the driers. The driers are of the indirect heat type and are constructed in the form of steel cylindrical shells set at a slight slope so that the material passes through by gravity when the drier is revolved. Although not specified, presumably coal is to be used as a fuel to supply the heat required for drying. It is proposed to remove all the moisture from the sludge by passage through the driers. The dried material will be elevated into a hopper, from which it will be fed into the gas producers. The gas will be stored in a tank and used in the operation of engines driving generators, and the ash will be marketed as a fertilizer base.

In the design of the plant for the production of gas from sludge, it is assumed that 4,000 gallons, or 20 cubic yards, of liquid sludge having a moisture content of 90 per cent. will be recovered from one million gallons of sewage. This assumption is evidently based on the results of measurements made in Germany and other European countries. In the larger cities of Germany the quantity of sludge deposited in sedimentation tanks varies from 10 to 25 cubic yards per million gallons of sewage. In this country, however, on account of the very much greater per capita water consumption, the quantity of sludge recovered in plain sedimentation tanks varies from 4 to 7 cubic yards per million gallons and averages about 5 cubic yards. It will therefore be seen that the assumption of 20 cubic yards is greatly in excess of what may be expected at Akron. No estimate is presented of the amount of garbage which will be delivered to the plant. For the first few years approximately 20 tons of the raw material may be expected, and within five years the daily production may exceed 25 tons.

The proposed method of de-watering the sludge by means of filter presses deserves some comment. Filter pressing in this country has been restricted to those plants in which chemical precipitation is used as a primary treatment. In this case the large amount of chemical sludge renders the sludge as a whole suitable for pressing. Filter presses have been tried in Germany to reduce the moisture content in sludge from plain sedimentation tanks. In a report of the Sewerage Division of the Emscher Association, by Dr. Ing. Fr. Spillner, it is stated that "filter presses are no longer used in Germany in large plants for the purpose of de-watering fresh settled sludge." It is pertinent to note that this process of drying sludge from plain sedimentation tanks has been abandoned in Germany, where the greatest progress has taken place in the preliminary treatment of sewage.

Presumably the drying of the sludge will be accomplished by the use of coal or other fuel. Little progress has been made either in this country or abroad in developing this method of artificial drying of sludge, but it is quite generally agreed by European authorities that the method is neither economical nor entirely hygienic. It is stated by Alexander Elsnar in the "Treatment and Utilization of Sludge":

"The value of the material as a fertilizer does not compare with the cost (of drying), especially of the coal, as will be shown later; so that such a method is quite impracticable, aside from the disagreeable and unhygienic features of the work due to the odors created."

The problem of economical drying of sewage sludge with the use of a fuel has not been satisfactorily solved, and it would not appear that the plans of the Public Service Finance Corporation present a feasible method.

Numerous studies have been carried on, especially abroad, to determine the feasibility of gasifying sewage sludge and of using it as a

fuel in the manufacture of producer gas. The former process consists in dry distillation of the material, while the latter process involves its complete destruction with the formation of producer gas and resultant ash. It is this latter process that is proposed for the Akron installation. The manufacture of producer gas from sewage sludge depends practically upon the value of the sludge as a fuel. The use of sewage sludge as a fuel has been studied rather extensively by European investigators, and it has generally been concluded that the sludge in itself does not offer advantages as a fuel but may serve as such when mixed with suitable quantities of peat, lignite, or coal. It should be noted that the use of such a mixture is not proposed in the operation of the Akron plant. Even with the admixture of a fuel, the disposal of sludge by burning offers advantages proportionate to the difference in cost between this method and other methods of disposal. It does not offer a means of securing a revenue from the operation of the plant. It may be interesting to note two quotations from Mr. Elsner's contribution on the "Treatment and Utilization of Sludge." In discussing the advantages of sludge utilization, he states:

"The hope of securing a revenue from sludge utilization equal to the cost of operation, or of making it a profitable undertaking, has long been destroyed, at least with city sewage."

Later he states:

"After the experience of the past in the utilization of sludge (and there will be but few important developments in the future), no more foul matter will be separated from the sewage than is demanded for sanitary reasons, without attempting to further increase the volume of utilizable sludge; for it is certain that with city sewage no profit can be secured sufficient to cover the cost of the plant and furnish additional revenue."

It is apparent that there is an opinion among the German investigators, who have made the most complete studies of the problem of sludge utilization, that this method of disposal of sludge is not advantageous either from an economical or hygienic standpoint. The plans of the Public Service Finance Corporation do not show in what way the problem as relates to Akron has been solved.

SUMMARY.

From the foregoing report it will be seen that the discharge of untreated sewage from Akron at the existing outlets creates a nuisance in the Little Cuyahoga River, especially during periods of low flow. During 1909 the city was enjoined from discharging untreated sewage into the river after December 14th, 1910. In the approval by the State Board of Health, June 29th, 1910, of a trunk sewer to be discharged into the Little Cuyahoga River two miles below the existing outlets, it was

provided that the city within six months submit a definite method for disposing of its sewage. Later, extension of time was granted to enable the carrying on of experiments to determine the best method of disposal. These experiments are now being conducted.

The plans of the Public Service Finance Corporation, representing the Hopcroft-Matlack process of sewage and garbage disposal, may be commented on as follows:

(1) No provision is made for diverting the excessive storm flow at the plant, and presumably this excess flow will pass through the various devices. Interference with the regular operation of the plant will thus result, the efficiency of the sedimentation tanks will be reduced, and clogging of the filters will take place.

(2) The screening of the sewage may be properly carried on, but the plans show insufficient detail of this feature of the plant.

(3) The introduction of garbage into the flowing sewage before it reaches the sedimentation tanks, greatly increases the suspended solids in the sewage, which is directly opposed to the effect for which the sedimentation tanks are used.

(4) The sedimentation tanks are not designed to produce the maximum removal of solids, inasmuch as alternate periods of agitation and sedimentation are provided. This is especially true as the plans do not sufficiently provide for the large quantities of sludge and scum which will be introduced when the garbage is added. It appears inevitable that considerable solid matter will pass through the tanks.

(5) The design of the percolating filters is objectionable in that an impracticable method of distribution is provided, unsuitable filtering material is selected, and improperly designed underdrainage channels are chosen. Any of these three features will interfere seriously with the operation of the filters, and it should be especially noted that the success of coarse grained continuous filters depends upon the proper application of the sewage at the surface.

(6) The plans include no provision for a final sedimentation basin, which is necessary to complete the purification process when percolating filters are used.

(7) Although not directly bearing upon the disposal of the sewage, it should be stated that the proposed method of disposition of the sludge by utilizing it as a fuel in a gas producer, is entirely at variance with the results of extensive studies made by various European engineers. The several features, including pressing, drying, and burning, may doubtfully be considered as economical in a system of sludge disposal.

ACTION OF THE BOARD.

At a meeting held July 18th, 1912, the State Board of Health considered the plans of the Public Service Finance Corporation, representing the Hopcroft-Matlack process of sewage and garbage disposal, approval

of which as a proposed installation for Akron was requested by Mr. Frank W. Rockwell, mayor, in a communication received July 8th, 1912, and they were disapproved.

The Secretary was instructed to inform the authorities of Akron that the Board was of the opinion that the plans do not provide for the efficient purification of the liquid portion of the sewage, or a logical or practicable method of disposal of the sludge and garbage; and further that the Board was cognizant of the fact that experiments were being carried on by the city to determine the most suitable method of purifying the sewage of the city, and would require that these experimental studies be continued to their completion in order that a logical solution of the problem of the disposal of sewage at Akron may be secured.

REPORT ON PROPOSED ADDITION TO SEWAGE PURIFICATION PLANT UNDER CONSTRUCTION AT ALLIANCE.

Following an inspection of May 27th, 1912, by a representative of the engineering department, the director of public service of Alliance was advised of the importance of providing a sludge filter as an adjunct to the sewage purification plant under construction at that city. On July 13th, 1912, a plan was received from Mr. E. G. Bradbury, consulting engineer for the city, for a proposed sludge filter. The plan was accompanied by the engineer's description of the proposed method of operation of the filter. After an examination of the plan, the following report was submitted:

The sewage purification plant at Alliance comprises three sedimentation or septic tanks; three sets of contact filters, divided into four units each; and three intermittent final filters. The ultimate installation provided by the original plans will include five intermittent final filters. The sedimentation or septic tanks have a capacity of approximately 50,000 cubic feet each, the largest one having a capacity of 52,000 cubic feet. In cleaning the tanks, it is necessary to drain the entire liquid and solid content through the sludge drain; and therefore to provide for flooding a sludge area to a depth of one foot, it is necessary to supply an area of approximately 50,000 square feet. Owing to the high percentage of the liquid portion, it is reasonable to suppose that during flooding, one-fourth of the volume may disappear, and it may therefore be assumed that with an area of approximately 40,000 square feet, the depth of flooding will not exceed one foot.

Proposed Sludge Filter. The plan of the consulting engineer provides for the utilization of one-half of one of the units of the intermittent final filters, to receive the sludge discharged from the sedimentation tanks. The area thus provided is approximately 20,000 square feet,

which is insufficient to receive the entire discharge from one of the tanks. To avoid overdosing this area, it is intended to apply the supernatant liquid in the sedimentation tanks, to one of the intermittent final filters in regular operation. By this means it is thought that about 50 per cent. of the contents of a tank may be disposed of, and that the remaining 50 per cent. containing the sludge may be satisfactorily applied to the proposed sludge filter. If this plan is carried out, the sludge filter will be flooded to a depth of about one foot. With extreme care in cleaning the tanks, it may be possible to apply the supernatant liquid to the intermittent final filters without causing their clogging, but it would appear that if any carelessness is practiced in draining the tanks, serious results may follow and the intermittent filters may be damaged or ultimately rendered inefficient. To avoid an occurrence of this kind, it would be advisable to provide an entirely independent area to receive all of the contents of the sedimentation tanks.

The filtering material to be used in the sludge filter will consist of 1.5 feet of fine cinders, supported upon a layer of coarse cinders varying in thickness from 9 inches to 1 foot. A system of underdrains will convey the effluent to the main effluent drain from the plant. The plan does not show any distributors to apply the sludge, and presumably it is intended to discharge the sludge at the side of the unit.

ACTION OF THE BOARD.

At a meeting held July 18th, 1912, the State Board of Health considered the plan providing for the installation of a sludge filter at Alliance by utilizing the area of one of the intermittent filter units, submitted by Mr. E. G. Bradbury, consulting engineer, July 13th, 1912, and the same was approved upon the following conditions:

1st. That the entire area (approximately 40,000 square feet) of the filter be utilized as a sludge filter either as one unit or divided into two units; and that the entire contents of the sedimentation tanks be discharged upon this area; and,

2nd. That this approval shall be considered void unless the sludge filter shall have been installed prior to July 1st, 1913.

The authorities were asked to advise their consulting engineer that in the opinion of the State Board of Health the use of the units, regularly employed as final intermittent filters, as areas to receive liquids from the sedimentation tanks incidental to cleaning, was objectionable and was likely to result in the rapid clogging of the filters; and that an entirely independent sludge filter, to receive both the sludge and supernatant liquids from the tank, should be provided.

REPORT ON PROPOSED SEWERAGE AND SEWAGE PURIFICATION FOR ANDOVER.

On March 9th, 1912, plans for proposed sewerage and sewage purification for Andover were received from Mr. B. F. Hewit, consulting engineer for the village. Based on previous inspections at Andover and a review of the plans, the following report was submitted:

Andover, a village with a population of 902, is located in the southeastern portion of Ashtabula County. The growth of the village has been slow and it is likely that its population will not be materially increased within the next ten years. The topography of the locality is undulating, and drainage is in an easterly direction to Shenango Creek, a tributary of the Ohio River. The village has a public water supply recently installed, but at the present time it has no sewerage facilities.

In May, 1910, the State Board of Health considered general plans for sewerage and sewage purification for Andover, submitted by Mr. L. E. Chapin, consulting engineer for the village. These plans were conditionally approved. In December, 1911, the Board conditionally approved of a change in the proposed location for sewage purification works.

In the early part of 1912 the village retained the services of Mr. B. F. Hewit to prepare detailed plans for sewage purification works.

SEWAGE PURIFICATION WORKS.

The design of the plant by the consulting engineer is based upon the assumption of a population tributary of 700 and a daily sewage flow of 70,000 gallons. The plant will consist of a screen chamber, sedimentation tank, sludge filter, dosing chamber, and intermittent sand filters.

Site. The location for the sewage purification works is that approved by the State Board of Health on December 20th, 1911. In a report dated December 14th, 1911, a complete description of this site is given. The village has purchased two acres at this location and this entire area is required by the plant as designed for immediate construction. To provide for future extension, an additional acre should be acquired at the present time.

Screen Chamber. The 12-inch outfall sewer from the village terminates in an inlet manhole from which the raw sewage may be by-passed to the southerly branch of Gravel Run. When the sewage plant is in operation, this by-pass is closed and the sewage passes from the inlet manhole to the screen chamber. This is of concrete construction 10.5 feet by 3 feet in plan and 1.5 feet in depth to the flow line. The screen chamber will have a hinged wooden cover to reduce the dissemination of odors. Two screens having $\frac{3}{4}$ -inch openings and constructed of $\frac{1}{2}$ -inch iron bars, will be provided.

Sedimentation Basins. The flow of sewage from the screen chamber is conducted to one or both sedimentation basins through a receiving trough provided with sluice gates and covered with wooden hinged doors. From the receiving trough, the sewage enters the sedimentation tanks. These are of concrete construction, rectangular in plan, each $37\frac{1}{2}$ feet by $8\frac{1}{2}$ feet wide and $6\frac{1}{2}$ feet in average depth to the flow line. The capacity of each unit is therefore 7,750 gallons, and the combined capacity furnishes a period of retention of five and one-half hours with a sewage flow of 70,000 gallons. Hanging baffles are provided at the inlet and outlet ends of the tank, and at a distance of two-thirds the length of the tank from the inlet end a submerged baffle is provided to retard the sludge movement. For the removal of accumulated solids, sludge drains leave each tank from two points to which the floors are sloped. The effluent from the tank flows over 4-foot weirs into the dosing chamber.

Sludge Filter. The sludge filter is 40 feet by 20 feet in plan, having an area of 800 feet. The discharge of the contents of one of the sedimentation tanks will flood the unit to a depth of 1.3 feet. The filtering material will consist of 2 feet of sand, and this will be underdrained by a single line of 6-inch vitrified pipe surrounded by gravel.

Dosing Chamber. The dosing chamber is placed across the ends of the sedimentation tanks. It is of concrete construction covered with a concrete roof, is 18 feet by 21 feet 4 inches in plan and has a depth to the flow line of $4\frac{1}{2}$ feet. Its capacity, therefore, is 12,900 gallons, and this quantity of sewage will flood each filter unit to a depth of 2 inches. The period of flow of the dosing chamber is four and one-half hours on a basis of 70,000 gallons, which corresponds to one cycle of the filters in 13.5 hours. From the dosing chamber a line of 12-inch cast iron pipe leads to the siphon chamber, which is situated in the center of a group of three sand filters. No details of the automatic apparatus are included in the design. The arrangement of the dosing chamber and siphon chamber is unusual but has been employed at Jefferson with satisfactory results.

Sand Filters. Three intermittent sand filters, each 151 feet by 74 feet in plan with an area of 0.233 acre, are provided. The total area provides a rate of 1,000 persons to the acre, or 100,000 gallons per acre per day. The filters are constructed partly in excavation and partly in fill, and will be divided and surrounded by earth embankments. The filtering material consists of 3 feet of sand obtained by dredging from Lake Erie near Erie, Pennsylvania. Analysis of the sand shows an effective size of 0.21 m.m. and a uniformity coefficient of 3.33; and a somewhat coarser and more uniform sand would be desirable. The sewage will be applied at the surface of the units by means of wooden distributing troughs discharging on concrete slabs, and the filtrate will be collected through a system of underdrains of vitrified pipe carried through a main drain to the stream.

SUMMARY.

From the foregoing it will be seen that the village of Andover purposes to construct a system of sanitary sewers with sewage purification. The site selected for the plant is satisfactory but should be of larger area to accommodate future extension. With a sewage flow of 70,000 gallons, the type of the plant to be built will insure a satisfactory effluent at all times if proper care in its operation is maintained. The design of the plant is of proper size to accommodate the present and immediate future requirements of the village, but with increased sewage flow, extensions may be required in the future.

ACTION OF THE BOARD.

At its meeting held March 21st, 1912, the State Board of Health approved these plans for proposed sewerage and sewage purification for Andover, submitted by Mr. B. F. Hewit, consulting engineer for the village, on March 9th, 1912, with the following conditions:

1st. That an area of at least three acres be acquired for the location of sewage purification works, to provide for future extensions;

2nd. That no connections to the sewers be made prior to the construction of the purification works;

3rd. That the plant be altered, repaired, or enlarged when in the opinion of the State Board of Health such alterations, repairs, or enlargements shall have become necessary;

4th. That samples of the filtering material be submitted to and receive the approval of the engineer of the State Board of Health;

5th. That plans of the automatic dosing apparatus be submitted to the State Board of Health;

6th. That the village council appoint a superintendent of sewers whose duties shall include the general supervision of the sewerage system, the maintenance of records of connections, etc., and the operation and care of the sewage purification works; and,

7th. That this approval be void unless contracts for construction of the sewers and sewage purification works shall have been let prior to January 1st, 1913.

REPORT ON PROPOSED SEWERAGE FOR ARLINGTON HEIGHTS.

On March 26th, 1912, plans and specifications for a proposed system of sanitary sewers for Arlington Heights were submitted by Mr. H. C. Innes of Hartwell, consulting engineer for the village. On March 29th a representative of the engineering department made an examination of the proposed improvements at Arlington Heights. The following report was submitted:

Arlington Heights, a village with a population of about 470, is located immediately north of the city of Cincinnati, between the east and

west forks of Mill Creek and just above their confluence. The village is at present provided with a public water supply obtained from Wyoming, which village is located immediately northwest of Arlington Heights. There are at the present time no other municipal improvements. The village itself is of a residential character and has no industries of importance. At the present time there are no sanitary or storm sewers within the village and it is desired to install a system of sewers before annexation to the city of Cincinnati occurs.

Proposed Sewerage. In the design of the sewerage system the consulting engineer has been limited by the available funds which the village can provide. It has therefore been necessary to design the sewers to conform to the topographic conditions, and this has resulted in the laying out of four independent sewer systems having as many outlets into the east and west forks of Mill Creek. Of these four systems, two will cover the main built up portion of the village and the other two will serve small districts in the southwestern and northwestern portions of the village.

The sewers are designed for an ultimate population of 1300 and will have a total length of three miles, consisting of 12,175 feet of 8-inch vitrified pipe, 2,050 feet of 10-inch vitrified pipe, and 1,650 feet of 12-inch vitrified pipe. The sewers will be constructed with cemented joints to exclude ground water. Manholes will be placed at all changes of direction and with one exception at all changes of grade. In this case the change will be to an increased grade. In all, twenty manholes, or seven per mile of sewer, are provided. This provides one manhole to each 754 feet, which is a greater length than should obtain with best principles of design. This is, however, necessitated by the funds available for the improvements.

There will be twelve dead ends on the sewerage system, and only three flush tanks are provided. The other dead ends will be provided with lamp holes through which the sewers will be flushed by means of fire hose. Two hundred and sixty Y connections for house sewers are provided.

As has been stated, it is proposed to establish four outlets into the east and west forks of Mill Creek. One outlet discharging into the east fork will be located about 100 feet below Clarke Road. Tributary to this outlet will be 3,975 feet of sewers. The location of this outlet may be permitted as there are few dwellings in close proximity. An outlet into the west fork is proposed to be located on the east bank of the stream 150 feet below Elliott Avenue; 9,625 feet of sewers will be tributary to this outlet. There are a number of dwellings in close proximity to this outlet and it would be objectionable at this point. The outlet should be carried at least 150 feet farther downstream. Directly opposite this outlet, an 8-inch sewer 750 feet in length will discharge. The small amount of sewage from this sewer may not be objectionable to

the surrounding residents and it will be unnecessary to carry this outlet farther downstream. About 1,300 feet north of the Elliott Street bridge it is proposed to establish an outlet for 1,300 feet of sewers. This outlet will not be established at the present time and is provided for future construction.

The proposed construction of all outlets provides an abutment to protect the outlet at the bank of the stream, and it is not contemplated to submerge any of the outlets. Submergence of the outlets would be difficult owing to the extreme shallowness of the creek during low stages.

The consulting engineer has not included in his plans the design of a sewage purification works and does not consider that this is a necessary adjunct. The discharge of sewage from Arlington Heights into the east and west forks of Mill Creek will without doubt be objectionable during low stages of the stream and will cause nuisances in the vicinity of the outlets. It is important to note, however, that the west fork of Mill Creek is already polluted above Arlington Heights by sewage from Wyoming and Lockland; also that in April, 1911, the Board approved of the establishment of an outlet for sanitary sewers at Reading, a short distance north of Arlington Heights. Below the confluence of the east and west forks, Mill Creek receives untreated sewage from Hartwell, Carthage, and Elmwood Place; also from state, county, and city institutions, before the stream enters the city of Cincinnati. Within the city it receives sewage from at least 200,000 people. Considering the extent of the pollution of Mill Creek and its two forks, it is evident that no improvement of conditions could result from the establishment of sewage purification works at Arlington Heights. It would, therefore, appear unnecessary to require such improvement.

ACTION OF THE BOARD.

At a meeting held April 11th, 1912, the State Board of Health considered the plans and specifications for a proposed system of sanitary sewers for Arlington Heights, submitted by Mr. H. C. Innes of Hartwell, consulting engineer for the village, March 26th, 1912, and approved the same subject to the following conditions:

1st. That the outlet proposed to be located on the east bank of the west fork of Mill Creek 150 feet below the Elliott Avenue bridge, be located at a point at least 150 feet farther downstream;

2nd. That the village install intercepting sewers or sewage purification works, or both, when in the opinion of the State Board of Health such sewers or works shall be considered necessary; and,

3rd. That this approval be void unless contracts for the construction of the proposed sewers shall have been made prior to September 1st, 1912.

At a meeting held July 18th, 1912, the State Board of Health considered a request made by the consulting engineer, Mr. H. C. Innes of Hartwell, for an extension of the time in which to let contracts for the construction of the proposed system of sanitary sewers for Arlington Heights.

The Board voted to revise the third condition of its approval given April 11th, 1912, to read as follows:

"3rd. That this approval be void unless contracts for the construction of the proposed sewers shall have been made prior to January 1st, 1913."

REPORT ON PROPOSED ENLARGEMENT OF SEWAGE PURIFICATION PLANT AT ASHLAND.

On April 16th, 1912, plans for a proposed enlargement of the sewage purification plant at Ashland were submitted by Mr. T. Brindle, city engineer. Based on an examination of the plans and a knowledge of local conditions obtained during a recent visit of a representative of the State Board of Health, the following report was submitted:

Ashland is located in the central portion of Ashland County near the headwaters of Jerome Fork, a minor tributary of the Muskingum River. The population in 1910 was about 6800, the growth during the previous decade having been 66 per cent. The city is provided with a water supply installed in 1895, and a system of sanitary sewers installed in 1902. At the time of the installation of sanitary sewers a purification plant was built and this has been used continuously since that time.

The sewers of the city are constructed entirely on the separate plan, and the sanitary sewers have a total length of approximately 15 miles. While no connections have been made for the removal of surface water, there are a number of downspout connections to the sanitary sewers and these contribute a large flow during wet weather. The sewage flow was studied in 1906 and 1907 by the State Board of Health and it was indicated by measurements taken at that time that the average daily flow was 340,000 gallons, or 113 gallons per person tributary. The fluctuations from the average were excessive, the minimum being less than 200,000 gallons and the maximum over 1,000,000 gallons; this excessive flow occurred during storms.

Present Sewage Purification Plant. The sewage purification plant installed in 1902 consists of three grit chambers, three septic tanks, and three intermittent filters. The septic tanks have a combined capacity of approximately 45,000 gallons, and the intermittent filters have a total area of five acres. The septic tanks have caused a nuisance by the creation of offensive odors and with the present sewage flow are totally inadequate to properly treat the sewage. The sludge accumulation in the

tanks is so great that frequent cleaning is required. Moreover, owing to the size of the tanks the sludge is mineralized to but a slight extent and drains slowly when placed upon the sludge area. This fact makes it impossible to clean the tanks as frequently as is necessary. The result, therefore, is the carrying over of suspended matters to the filters.

The intermittent filters were constructed by stripping and underdraining the natural sandy gravel on the site of the plant. The total area is divided into six units which range in size from one-half to one acre. No provision is made for distribution of the sewage at the surface and the natural result is the ponding of the applied sewage. The filters have been neglected somewhat in the past and it has been necessary to overhaul them frequently. In spite of the poor condition of the plant, however, it has almost always produced an effluent which is clear, odorless, and non-putrescible. For the drying of the sludge a portion of one of the intermittent filters, 0.15 acre in area, is used.

With the inefficient sedimentation which is obtained by the existing tanks, the plant as a whole causes objection on account of the offensive odors which it produces. In extending the plant, therefore, it is proposed to add to the sedimentation capacity and thus improve the working efficiency of the plant.

Proposed Enlargement. The plans of the city engineer provide for the enlargement of the existing septic tanks by the construction of three additional tanks, which will increase the total capacity from 45,000 gallons to 219,000 gallons. The new tanks will be of reinforced concrete construction, the side walls being strengthened by tie beams and buttresses alternating 20 feet on centers. The present septic tanks are each 35 feet long, 10 feet wide, and 6 feet in average depth. The enlargement provides three tanks, each of which will receive the effluent from one of the old septic tanks. The new tanks will be 125 feet, 100 feet, and 100 feet, respectively, in length, 10 feet in width, and about 7 feet in average depth. The total capacity provided, 219,000 gallons, is sufficient for an eight-hour period of flow on a basis of 650,000 gallons sewage flow. Connections to the existing tanks will be through 10-inch pipe lines placed about 3 feet below the flow line. By this means each of the new tanks will serve as an extension of one of the present tanks. The arrangement provides the possibility of cutting out any tank from service for cleaning or repairs.

The sewage entering the new tanks through the 10-inch pipes, flows to the opposite ends where it leaves in a thin sheet over the end walls into a cross channel. From one end of this channel the effluent passes over an aerator 30 inches wide and 12 feet long, sloped at an angle of 30 degrees. The aerator is surfaced with cobble stones, over which the tank effluent will pass. From the aerator the effluent enters the old carrier ditch leading to the filters.

No baffles are provided in the design of the new tanks. To improve the distribution of flow, baffles should be placed at the inlet and outlet ends of the tanks at least.

The bottoms of the new tanks are sloped to central gutters running through the tanks longitudinally, which lead to the inlet ends where valved sludge drains are placed to convey the deposited solids to the sludge area. The length of the tanks is excessive in proportion to the width, and it may be found difficult to transport the sludge to the points selected for sludge removal. It would perhaps be advisable to place sludge drains at the central portion of each tank. The new tanks are not provided with a roof or cover although it was found necessary several years ago to cover the old septic tanks. The proximity of the plant to a public highway immediately north, will probably necessitate the covering of the new tanks. At the present time the plant is well located as regards dwellings, and no complaint from odors should arise from this cause.

The present sludge area, 0.15 acre, is inadequate to receive the discharge from one of the new tanks. In order to prevent flooding to a depth greater than one foot, approximately 10,000 square feet, or 0.23 acre, should be provided. Separation of this area into two units is advisable.

ACTION OF THE BOARD.

At a meeting held May 9th, 1912, the State Board of Health approved the plans for a proposed enlargement of the sewage purification plant at Ashland, submitted by Mr. T. Brindle, city engineer, on April 16th, 1912, subject to the following conditions:

- 1st. That a suitable roof or cover be placed on the proposed new septic tanks;
- 2nd. That an area of at least 0.23 acre be provided for the draining and drying of sludge; and,
- 3rd. That this approval shall be void unless the proposed enlargement shall have been made prior to November 1st, 1912.

The attention of the authorities was also called to the following advice given the city engineer:

- (1) That suitable baffles should be provided to distribute the flow in the tanks.
- (2) That to facilitate sludge removal, it may be necessary to provide drains leaving the central portion as well as the inlet end of each tank, and that connections for such drains should be included in the design.
- (3) That plans showing these changes should be filed with the engineer of the State Board of Health.

REPORT ON PROPOSED ADDITIONAL SANITARY SEWERAGE FOR ATHENS.

On August 24th, 1912, Messrs. R. D. Williams, director of public service, and F. H. Beckler, city engineer, submitted general plans for

proposed additional sewerage for Athens. On September 4th, 1912, one of the assistant engineers visited Athens and made an examination of the existing sewerage conditions and of the proposed improvement. The following report was submitted:

Athens, a city with a population of 5,500, is located in the central part of Athens County on the Hocking River. The topography of the city and surrounding country is very hilly, there being a difference in elevation of more than 200 feet within the city limits. The drainage from the city reaches the Hocking River, which stream flowing from the north almost encircles the city and thence follows an easterly direction.

Athens is provided with a public water supply derived from wells, a municipal light plant, some fourteen miles of paved streets, and a fairly complete system of sewers constructed on the separate plan. The population of the city is increased by approximately 1,000 during eleven months of the year by the attendance at the Ohio University.

Existing Sanitary Sewers. Prior to 1894, the city was poorly provided with sewerage facilities, having only a few storm water drains. Before this time, however, the Hocking River received the sewage from the Athens State Hospital, an institution located south of the Hocking River and discharging sewage at a point opposite the extreme southerly portion of the city. The presence of a dam in the river in the easterly portion of the city influenced the flow in the stream and at times of low flow the back water was noticeably polluted by the sewage from the institution.

In 1894 the State Board of Health considered plans for a comprehensive system of sanitary sewers prepared by Messrs. Chapin & Clark, consulting engineers for the village. These plans provided for the establishment of a single outlet near Mill Street at a point in the extreme easterly portion of the city, just below the dam above referred to, but did not include provision for purification works. Under date of September 7th, 1894, the mayor and council were advised that the proposed outlet had been approved. In the construction of the system of sanitary sewers, difficulty was encountered on account of quicksand in connecting certain portions of the system in the southerly section of the city with the main outfall sewer. Without notifying the State Board of Health, therefore, the plans were somewhat changed and two additional outlets into the river were established, at the foot of Cemetery Street in the southwesterly portion of the city, and at the foot of Vine Street in the southerly portion of the city. The main outlet just north of Mill Street discharges the bulk of the sewage from the city. The outlet at Cemetery Street receives only a small flow of sewage and the outlet at Vine Street discharges the sewage from the Ohio University and a small district in the central portion of the city. Aside from these three outlets, the sewage from the Athens State Hospital is discharged into the Hocking River almost opposite the Vine Street outlet.

As far as data are available the discharge of sewage into the Hocking River at the points described does not create very objectionable conditions in the stream. The dam in the easterly portion of the city, below which the Mill Street sewer discharges, has been partially removed and permits a freer flow of the stream than was formerly the case. This may account for the absence of nuisances caused by the sewage discharged above the dam. During extreme low flow of the river it is probable that some objectionable conditions are created at the sewer outlets and as the flow of sewage increases, this effect will undoubtedly become more evident. The outlets are all well located as regards the proximity of the built up districts. Each outlet is several hundred feet from dwellings and owing to the nature of the valley of the river, the land near the outlets will probably never be used for building purposes.

The Hocking River above Athens has a watershed area of about 875 square miles. The following is a list of cities above Athens which are located upon the river and discharge untreated sewage into the stream.

<i>City.</i>	<i>Popula- tion.</i>	<i>Miles above Athens.</i>
Nelsonville	6,000	11
Logan	5,000	22
Lancaster	13,000	40

The discharge of sewage from these cities creates more or less objectionable conditions during extreme low flow and before many years it will be required that improvements be made in the disposal of sewage. Below Athens, the Hocking River follows a generally southeasterly course, twenty-six miles to its confluence with the Ohio River. Below Athens no communities are located upon the stream but upon the Ohio River, Pomeroy and Gallipolis are situated, seventy-three and ninety-three miles distant, respectively.

It will be seen that the discharge of sewage from Athens must be considered from the standpoint of the possibility of stream pollution, rather than contamination of a public water supply.

Proposed Additional Sewers. The plans of the city engineer provide for the installation of sanitary sewers in a small residential district in the extreme southeasterly portion of the city. This district which has recently been built up has some seventy houses and the ultimate population will reach 500. The proposed sewers will comprise about 4,300 feet of vitrified pipe the sizes of which are not indicated on the plans submitted. The plans also do not show the grades, location of manholes or flushing facilities. These features should be incorporated in revised, detailed plans. The proposed outlet for the system is into the Hocking River in the extreme southeasterly portion of the city at a point well removed from built up districts. The plans do not show the details of constructing the outlet. With regard to the selection of the outlet,

topographical conditions prevent a connection of the proposed system with the existing Vine Street sewer and consideration of cost prevents its connection with the existing Mill Street sewer.

The discharge of sewage from the proposed outlet which may amount in volume to 50,000 gallons per day, will not create objectionable conditions during normal stages of the stream. During extreme low flow the additional sewage may contribute to the production of a nuisance in the river.

SUMMARY.

From the foregoing report it will be noted that the city of Athens did not carry out the plans approved by the State Board of Health in 1894, for a comprehensive system of sanitary sewers with a single outlet into the Hocking River. Instead three outlets were established without consultation with the Board. No evidence is at hand to show that the discharge of sewage into the Hocking River at the several outlets creates a nuisance in the stream. The additional sewage contributed by the proposed sewers will not materially increase the likelihood of a nuisance.

Ultimately, it is quite probable that purification of the sewage from the city will be required and this will necessitate the collection of the sewage at one outlet. The possibility of this should be recognized at this time and the plans for the proposed additional sewers should be made to conform with a comprehensive plan of collecting the sewage from the entire city to one point.

ACTION OF THE BOARD.

At the meeting of the State Board of Health held September 12th, 1912, the general plans for proposed additional sewerage for Athens, submitted August 24th, 1912, by Messrs. R. D. Williams, director of public service, and F. H. Beckler, city engineer, were approved subject to the following conditions:

- 1st. That before contracts are awarded detailed plans, satisfactory to the Engineer of the State Board of Health, be submitted for the proposed sewers, showing sizes, grades, manholes, flushing facilities, construction of outlet, etc., which plans shall indicate clearly the possibility of connecting the proposed system to an intercepting sewer designed to convey the sewage from the entire city to one point of outlet.

- 2nd. That detailed plans for an intercepting sewer to convey the sewage from the entire city and the Athens State Hospital to one outlet, and plans showing all existing sewers within the city, be prepared and submitted to the State Board of Health.

- 3rd. That an intercepting sewer be constructed and that the sewage from the entire city be purified in a manner satisfactory to the State Board of Health when deemed necessary by said Board.

- 4th. That this approval shall be void unless the plans required by Condition 1 shall have been submitted prior to December 1st, 1912, and the plans required by Condition 2, shall have been submitted prior to June 1st, 1913.

REPORT ON PROPOSED SEWERAGE FOR BEDFORD.

On March 27th, 1912, a communication was received from Mr. C. W. Courtney of Cleveland, consulting engineer for Bedford, requesting an investigation of proposed sewerage for that village. On April 19th, 1912, one of the assistant engineers visited Bedford, and on April 22nd, plans for proposed combined sewers were received from the consulting engineer. The following report was submitted:

Bedford, a village with a population of about 1,800, is located in Cuyahoga County three miles southeast of Cleveland. The village is situated on Tinker's Creek, a tributary of the Cuyahoga River, which it joins about five miles west of the village. The topography is dissected by several ravines formed by small tributaries of Tinker's Creek, and the general drainage is in a southwesterly direction.

The village has at present no municipal improvements aside from a few paved streets and several short storm sewers. Arrangements are being made for a public water supply to be obtained from the city of Cleveland, and recently a bond issue has been voted for the installation of sewers and a sewage purification plant.

Proposed Sewerage. The plans of the consulting engineer provide for the installation of a complete system of combined sewers to cover practically all built up portions of the village. The sewers will be laid out in two main districts covering the northwesterly and southeasterly portions, respectively. For each district it is designed to provide two storm water overflows located in ravines tributary to Tinker's Creek at points suitably removed from habitations. A main intercepting sewer from each district will conduct the dry weather flow to a sewage purification plant which is to be located in the valley of Tinker's Creek about one mile west of the center of the village and immediately west of the corporation line. The sewers vary in size from 10 inches to 24 inches, and the intercepting sewers leading to the disposal plant have a combined capacity equivalent to an 18-inch line. It is evident that this capacity is sufficient to carry to the plant large quantities of storm water.

If the sewers as designed are properly constructed, the operation of the overflows may cause no nuisance. At times of overflow at the points selected, the small streams will probably be swollen to such an extent that the overflow will be removed rapidly to Tinker's Creek and the Cuyahoga River, and no nuisance will be created near the village. The design of the combined sewers, moreover, provides a saving of cost for the property owners of the village by reducing the number of sewer connections necessary, and this is the main point of advantage suggested by the consulting engineer in favor of the combined sewers. There are, however, a number of disadvantages which must be considered. Owing to the small size of Tinker's Creek, which receives the sewage, a properly constructed sewage

purification plant will be required to purify the dry weather flow, and it is of the utmost necessity that the sewage flow reaching the plant be reduced to a minimum. This can only be done by separating the sewage from the storm water. During periods when the intercepting sewers will discharge their capacity of flow, the sewage purification plant will be heavily overworked and may be seriously damaged. Following such misuse, the plant will not be capable of properly purifying the dry weather flow during periods when the stream flow is small. This will result in the creation of a nuisance in Tinker's Creek.

ACTION OF THE BOARD.

At a meeting held May 9th, 1912, the State Board of Health considered the plans for a system of combined sewers for Bedford, submitted by Mr. C. W. Courtney of Cleveland, consulting engineer, April 22nd, 1912, and voted to withhold its approval of the same.

The Board was of the opinion that where purification of the sewage is required, it is advisable to install a separate system of sewers. The authorities were advised, however, that if the village desired to install a combined system of sewers, it would be necessary to provide the following features:

1st. Means for adequate flushing of the sewers to prevent the standing of the solid matter; and,

2nd. Revision in the design of the main or intercepting sewer leading to the purification works according to one of the following plans:

(a) By adapting the capacity of the intercepting sewer or sewers to carry only the dry weather flow of sewage so that any flow in excess of this, during periods of considerable rainfall, will go directly through the proposed overflow into the ravines connecting with Tinker's Creek; or,

(b) By installing an additional overflow at the purification works in order that the works may not be overloaded in times of floods, this overflow to be provided in case the capacity of the intercepting sewers is equivalent to that of a pipe 18 inches in diameter, or larger; or,

(c) By designing the main intercepting sewers with such capacity as to carry the maximum sewage flow and compel the discharge of all additional flow through an overflow into Tinker's Creek.

They were also advised that the Board would consider revised plans prepared in accordance with the foregoing advice.

REPORT ON PROPOSED MODIFICATION OF PLANS FOR SEWAGE PURIFICATION PLANT FOR BELLEFONTAINE.

On March 30th, 1912, a communication was received from Mr. John Weidinger, director of public service of Bellefontaine, requesting that the

Board permit certain changes in the construction of the sewage purification plant for that city. The following report was submitted:

On June 30th, 1910, the State Board of Health approved of plans for a sewage purification plant for Bellefontaine, submitted by The Riggs and Sherman Company, consulting engineers, June 29th, 1910, upon the following conditions:

"1st. That 2 acres of intermittent sand filters be submitted for the final treatment by broad irrigation unless it is amply demonstrated to the satisfaction of the engineer of the State Board of Health that the soil is of satisfactory character for this purpose;

"2nd. That plans for all automatic controlling machinery be submitted to and receive the approval of the engineer of the state Board of Health before being installed;

"3rd. That samples of all contact and filtering material be submitted to and receive the approval of the engineer of the State Board of Health before being placed;

"4th. That complete plans and specifications be filed with the State Board of Health as soon as same are prepared;

"5th. That as soon as the works are completed there be appointed by the city a competent person to act as superintendent of sewerage and sewage purification; and,

"6th. That the sewage purification plant be completed and ready for operation before any house connections whatsoever are made with the sewerage system."

The design of the plant provided sedimentation, contact treatment, and sand filtration. To carry out the first condition of approval the consulting engineers conducted experiments to determine the feasibility of treating the contact filter effluent by land filtration, and on June 28th, 1911, the then assistant engineer visited Bellefontaine and examined the progress of the experiments. At this time it appeared that the use of natural filtration would be feasible. It was pointed out, however, that there were a number of features, such as rainfall, freezing weather, etc., which had not been included in the experiments, and that the proper operation of the areas for natural filtration under severe conditions was not wholly assured. It was suggested also that ultimately the use of sand filters would be required.

The proposed modification of the plans consists in the omission of intermittent filters for the final treatment of the contact filter effluent until the necessity for the same is demonstrated. The omission of this feature is desired for the reason that insufficient funds are at present available to properly install intermittent filters and complete the other features of the sewerage system and purification works.

The construction of the sewage purification plant has progressed and at the present time the sedimentation tanks and contact filters have been practically completed. With the installation of a sludge unit and the finishing of the contact filters, this portion of the plant will be ready for operation. The plant carried to this degree of completion should furnish an effluent which will be practically non-putrescible during a large portion

of the time and one which will not create excessively bad conditions in the stream. It would be desirable to provide tertiary treatment to insure the quality of the effluent at all times, but it seems advisable to provide such treatment permanently, rather than to expend a relatively large amount of money upon a scheme the practicability of which is not demonstrated. Land filtration may or may not be satisfactory and consequently the expenditure for the installation of this feature may be unwarranted. It is intended ultimately to construct intermittent sand filters for the treatment of the contact filter effluent, and until the finances of the city will permit of this comprehensive improvement, it would appear advisable to omit the preparation of the area for land filtration.

ACTION OF THE BOARD.

At a meeting held April 11th, 1912, the State Board of Health considered the request that certain changes be permitted in the construction of the sewage purification plant for the city of Bellefontaine, and voted to rescind its first condition of approval of plans for the sewage purification plant for Bellefontaine given June 30th, 1910, and to substitute in place thereof the following condition:

1st. That two acres of intermittent sand filters be constructed for final treatment of the contact filter effluent prior to October 1st, 1914, unless future examinations by the State Board of Health demonstrate that such construction is unnecessary; provided, that should the present disposal works not produce a non-putrescible effluent or an effluent which will be innocuous with respect to health, then the city will at once add the proper devices to treat the sewage with hypochlorite of lime or sodium in a manner to eliminate the pathogenic and fermentative organisms from the effluent before it is discharged into Possum Run.

REPORT ON PROPOSED SEWERAGE FOR SEWER DISTRICT NO. 4, BOWLING GREEN.

On January 6th, 1912, plans for proposed sewerage for Sewer District No. 4, Bowling Green, were received from Mr. F. G. Gallier, city engineer. Based upon a review of the plans and a knowledge of local conditions secured at previous visits, the following report was submitted:

Bowling Green, a city of 5,200 population, is located in Wood County on the Portage River watershed. The city is fairly well supplied with municipal improvements, having a public water supply, a rather complete system of sewers, and a number of miles of paved streets. The topography in the vicinity is flat and surface drainage must be assisted by the construction of ditches. The geological formations consist of limestone,

which is encountered a short distance below the surface and which is covered by a glacial drift capping.

Previous Actions of the State Board of Health. In 1900 the Board was first called upon to approve of sewers for Bowling Green. Previous to this time the city had an incomplete system of storm sewers, which were misused to some extent for carrying house drainage. Plans were submitted by Mr. H. E. Riggs, consulting engineer, in 1900, and on October 17th, the Board voted to approve the plans subject to the following conditions:

"First, that present sewers now in use be abandoned for carrying house drainage.

Second, that provision be made for purifying the sewage in a manner satisfactory to the State Board of Health within three years' time from the completion of the main outlet sewer."

The construction of this sewerage system was begun two years later, and it is estimated that to date some two miles of storm sewers and 7.8 miles of sanitary sewers have been built.

The condition providing for the installation of sewage purification works, following the construction of sanitary sewers, has not been fulfilled.

In 1908 a complaint, under the Bense Act, against the city of Bowling Green for the pollution of Poe Ditch by the discharge of sewage from the city, was received. In January 1909, an order approved by the Governor and the Attorney General was issued by the State Board of Health, requiring the city of Bowling Green to purify its sewage in a manner satisfactory to said Board on or before December 1st, 1909.

Following this order nothing was done by the city to improve conditions, and in February 1910, the city solicitor was reminded of this fact, and inquiry was made to learn of the intentions of the city officials. No reply was made to this inquiry.

Present Sewerage. The present sewers of the city consist of approximately two miles of storm sewers and 7.8 miles of sanitary sewers. With the exception of a few short sewers, the system is entirely on the separate plan. The records show the existence of 450 house connections, of which some 275 are for sanitary purposes. The present system has two outlets. One of these outlets, a 12-inch pipe, drains about one-fourth of a mile of sewers, accommodating a short territory west of the T. & O. C. Railroad and south of Court Street. This outlet discharges at the upper end of the so-called Thurston Ditch. The other or main outlet, a 30-inch pipe, discharges into Thurston Ditch at Leroy Avenue. This outlet serves the principal portion of the sewerage system. Except during wet weather the entire flow of Thurston ditch consists of sewage.

Thurston ditch follows a northerly course and enters Poe ditch about 1,000 feet north of Leroy Avenue. Poe ditch follows an easterly course and enters the north branch of the Portage River about four miles east

of Thurston ditch. Needless to say, extremely objectionable conditions prevail in both of the ditches, and at the Portage River marked evidences of sewage pollution have been observed.

Proposed Sewerage. The additional sewerage proposed for Sewer District No. 4 is intended primarily to provide drainage for the site of the proposed state normal school. Recently, a location having an area of about 45 acres and situated in the extreme easterly portion of the city has been selected as a site for a state normal school, and in the near future it is proposed to construct the various buildings which will be required. At the present time no sewers are available in this district, and it is the intention of the city to provide adequate drainage facilities.

The plans of the city engineer provide three independent propositions. One includes the construction of a main sewer extending along the south and easterly limits of the city and thence following a northerly course to Poe Ditch, entering it at a point about 1,900 feet east of Thurston ditch. This will involve the construction of a main sewer with a total length of 6,000 feet. The second proposition provides that instead of carrying the main sewer directly to Poe ditch, the outlet be located in Thurston ditch at Leroy Avenue opposite the present main outlet. The third proposition provides for the construction of a main sewer along the southerly boundary and across the site and extending to the proposed Leroy Avenue outlet.

In case any of the propositions are selected, the main sewers are to be of vitrified pipe ranging in size from 12 to 18 inches, and laterals will be constructed according to the location of the proposed buildings. It appears that ample drainage will be secured which ever proposition is adopted, although from considerations of cost, either of the first two propositions is preferable.

No estimate has been made of the probable population which will become tributary to the sewers and this will depend almost entirely upon the development of the normal school. In addition to the school, there may ultimately become tributary the entire population of District No. 4. District No. 4 is at present sparsely populated and there is little likelihood of extensive growth in the future.

ACTION OF THE BOARD.

At a meeting held January 17th, 1912, the State Board of Health disapproved these plans, submitted by Mr. F. G. Gallier, city engineer, on January 6th, 1912, providing for the construction of sewers in Sewer District No. 4, Bowling Green, and for the discharge of crude sewage through alternate outlets into Thurston Ditch at Leroy Avenue and into Poe Ditch some 1,900 feet east of Thurston Ditch.

It being stated by representatives present that the city of Bowling Green would install sewage purification works as soon as possible, the

Board agreed to approve plans to be presented at its February 15th meeting, which would comprise the following:

"1. A plan, satisfactory to the State Board of Health, which will provide for all the sewage of the city being collected at one point where it can ultimately be purified, the location for sewage purification works to be specified in said plan; and,

2. The written agreement by the city of Bowling Green that such sewage purification works will be installed within two years from the date this plan is approved."

On January 31st, 1912, Mr. C. L. Moyer, city engineer, submitted revised plans for proposed sewerage for Sewer District No. 4, Bowling Green, including an improvement in the present sewerage system. On February 8th, 1912, there was received the following resolution by the city council and agreement by the city officials with the State Board of Health:

"WHEREAS, The State Board of Health has condemned the manner in which the city of Bowling Green is disposing of its sewage, and,

WHEREAS, The State Board of Health has required that the said city of Bowling Green proceed to build a disposal plant in order to dispose of its sewage, and,

WHEREAS, Said city is desirous of building said plant, but by reason of its financial condition and tax limitation it is unable to conform to the demands of said Board at this time, and,

WHEREAS, Said Board, upon the promise of said city to prepare itself to build said plant in the near future, has extended the time two (2) years when said disposal plant shall be built upon said city promising in writing that said plant will be built in two (2) years from date, Now therefore,

Be it resolved by the City of Bowling Green, State of Ohio, That the mayor and director of public service of said city be directed and authorized to enter into an agreement in writing with State Board of Health, promising on behalf of the said city to build a sewage disposal plant in two years from the date of said agreement.

Passed January 25th, 1912.

D. W. PUGH,
President of Council.

Attest: R. S. SWEET,
Clerk of Council.

Approved: D. C. VAN VOORHIS,
Mayor."

"BOWLING GREEN, OHIO, February 6, 1912.

To the Honorable State Board of Health, Columbus, Ohio.

GENTLEMEN:—In pursuance of a resolution of council of the city of Bowling Green, Ohio, passed January 25, 1912, certified copy of which resolution is hereto attached for reference, and in conformity to the wishes of your board, the said city of Bowling Green, Ohio, hereby promises and agrees that on condition of your said board approving sewer plans for Sewer District No. 4, in said city, that it will commence on April 1, 1914 and construct with all reasonable diligence to completion a sewage disposal plant for said city.

In witness whereof, the said city of Bowling Green, Ohio, by its said officers, has hereunto caused to be affixed its name and corporate seal, and the names of its officers, and the attestation of the clerk of said city this 6th day of February, 1912.

THE CITY OF BOWLING GREEN, OHIO,
By D. C. VAN VOORHIS,
Mayor.

Attest: R. S. SWEET,
Clerk.

W. A. MARINER,
Director of Public Service."

After an examination of the revised plans by the acting chief engineer, the following report was submitted:

Proposed Sewerage Improvement. Briefly stated, the revised plans of the city engineer provide for the establishment of a sewer outlet into Poe Ditch at a point 1,900 feet east of Thurston Ditch, and the construction of main sewers which will provide for the abandonment of the existing 12-inch combined sewer outlet at the head of Thurston Ditch, and of the 30-inch sanitary sewer outlet into Thurston Ditch at Leroy Avenue. By the construction of these main sewers the sewage from the existing outlets will be carried to the proposed outlet into Poe Ditch, which will then constitute the only outlet for the sewerage system of the city. The proposed sewerage for Sewer District No. 4 will be tributary to this main sewer.

The sewage from the combined sewer outlet at the head of Thurston Ditch will be conveyed through a proposed 18-inch sewer connecting to a 40-inch sewer, which will also receive the discharge from the 30-inch sanitary sewer outlet at Leroy Avenue. This 40-inch sewer follows an easterly course to Douglas Avenue, at which point a proposed 18-inch main sewer from Sewer District No. 4 is tributary. From this point a 48-inch main sewer follows a northerly course to Poe Ditch. The sewers will be constructed entirely of vitrified pipe with cemented joints, and manholes will be provided at the changes of grade and direction.

The location of the proposed outlet, although more satisfactory than the location of the existing outlets, is nevertheless open to objection. The nearest dwelling within the corporation is 700 feet southwest of the outlet, and there are no other dwellings within a distance of 1,000 feet. Below the outlet Poe Ditch follows Poe Road and passes a number of farm houses which are located along the road.

As far as the pollution of Poe Ditch is concerned, the proposed sewerage improvements will not alter the present conditions. The nuisances resulting from the discharge of crude sewage will, however, be transferred to a point more remote from the built up portion of the city and will remove cause for complaint by citizens in the vicinity of Thurston Ditch. Residents along Poe Road will, however, have just cause for

complaint. The establishment of the outlet into Poe Ditch may be considered a step in the direction for providing for the ultimate purification of the sewage and should be permitted only with this in view.

ACTION OF THE BOARD.

At a meeting held February 15th, 1912, in accordance with the agreement entered into between the officials of Bowling Green and the State Board of Health on February 8th, 1912, and as further agreed by the mayor and the director of public service at the meeting held February 15th, 1912, the State Board of Health approved the revised plans for proposed sewerage for Sewer District No. 4, Bowling Green, including an improvement in the present sewerage system providing for the collection of the entire sewage of the city at one outlet, submitted January 31st, 1912, by Mr. G. L. Moyer, city engineer; (these plans having been submitted in accordance with the agreement made by representatives of the city at the meeting of the Board, January 17th, 1912), provided:

1st. That plans for the purification of the sewage of the entire city be prepared and presented to the State Board of Health for approval not later than November 1st, 1913;

2nd. That construction of a sewage purification plant, according to plans approved by the State Board of Health, shall be begun not later than April 1st, 1914; and,

3rd. That the said plant shall be completed and in operation not later than September 1st, 1914.

REPORT ON PROPOSED SYSTEM OF COMBINED SEWERS FOR BREMEN.

The State Board of Health, at a meeting held February 15th, 1912, rescinded its action of September 14th, 1912, disapproving the source of water supply selected by the village of Bremen. This action was taken, on representation of officials of the village that plans were being prepared for a system of sewers that would effectually drain all property within a radius of one thousand feet of the selected source of supply, subject to compliance with the following conditions:

1st. That plans for sewers, as specified above be completed at the earliest possible time and be submitted to the State Board of Health for approval, and that these sewers be constructed as soon as possible.

2nd. That as soon as sewers in this district have been completed all cesspools and privy vaults within one thousand feet of these wells be abandoned, thoroughly cleaned and disinfected and be filled with clean earth, ashes or concrete, level with the surrounding surface and connections be made direct from the house drains to the sewer;

3rd. That all visible sources of pollution of the subsoil on premises within one thousand feet of the source of supply be thoroughly disinfected and rendered innocuous; and,

4th. That no taps shall be made to the mains through which drinking water can be taken prior to the completion and starting in operation of the sewer system excepting upon approval of the Secretary of the State Board of Health.

In compliance with the first condition of approval, on March 27th, 1912, plans for a proposed system of combined sewers were submitted by Mr. E. R. Johnston, engineer for the village. On March 29th, an inspection on the ground was made by a representative of the engineering department, and the following report was submitted:

Bremen, a village with a population of about 925, is located in Fairfield County on Rush Creek. The topography of the surrounding country is rather hilly, but the village itself is built upon the broad level valley of the stream. Bremen is at present provided with a municipal water supply installed during 1911, prior to the approval of the Board. The water supply is at present used principally for fire protection and to a limited extent for domestic purposes.

Present Sewerage. A partial system of combined sewers was installed during 1910 without the knowledge or approval of the State Board of Health. These sewers cover what is known as Sewer District No. 1, which comprises practically the eastern half of the built up portion of the village. The total area of this district is 120 acres, and the sewers have a total length of 2.1 miles. Up to the present time about 25 connections for sanitary purposes have been made to this system of sewers. The outlet into Rush Creek is located about one-half mile south of the built up portion of the village near the extension of Broad Street. It is claimed that no nuisance has been created by the discharge of the dry-weather flow into the stream. The truth of this assertion cannot be substantiated by observations made by the representative of the State Board of Health, as the stream was at medium high stage at the time of the inspection.

Proposed Additional Sewers. In order to comply with the conditions imposed by the Board in the approval of the public water supply, the village has had prepared plans for sewers to drain all property within 1,000 feet of the public supply wells. Owing to the flatness of the topography, storm sewers are required in all portions of the village to remove the surface flow, and in the design of the proposed system the engineer has taken into account this fact and has provided combined sewers.

The district for which the sewers are designed, known as District No. 2, has a total area of 260 acres, 130 of which include the westerly half of the built up portion of the village. The remaining area of the district lies outside of the built up portion and includes elevated ground bordering the district on the north and west and low-lying ground near

Rush Creek. The sewers proposed will vary in size from 10 inches to 24 inches, and will have a total length of 2.2 miles. Y branch connections extending to the curb line will be placed at each lot to provide for the installation of sanitary connections to the sewers. No flush tanks are to be installed at dead ends and the storm flow will be depended upon to keep the sewers clean. Flushing by fire hose will also be employed.

The present population of District No. 2 is about 500 and its ultimate population may reach 1,500. On the basis of the present population, the average sewage flow will be 30,000 gallons per day. The maximum storm-flow which will reach the sewers is estimated to be 3,500 cubic feet per minute. This quantity is arrived at by assuming a maximum hourly precipitation of $1\frac{1}{2}$ inches, and an average run-off from the district of 15 per cent. This calculation indicates that the 24-inch main outfall sewer at a grade of 1.5 feet per thousand, is of inadequate size to remove the maximum run-off.

It is proposed to establish an outlet for the system into Rush Creek at a point about one-half mile south of the village and some 200 feet downstream from the existing outlet. Rush Creek has a watershed area above the proposed outlet of 157 square miles and the watershed is rather hilly. The flow of the stream, therefore, fluctuates rapidly. No measurements or estimates of the extreme dry weather flow are available, but it is probable that this flow is sufficient to satisfactorily dilute the volume of sewage which may be expected from the village for a number of years.

The elevation of the invert at the outlet is 782.4 feet, which is also low-water elevation of the stream. Any rise in the stream will therefore back up the flow in the sewer. The elevation of the sewers near the waterworks property is 792.2 feet. The average high-water elevation of Rush Creek is 789 feet and the maximum high-water elevation is 792.4 feet. This elevation is 0.2 foot higher than the invert of the sewers at the waterworks property, and it will be seen that the sewers will become flooded at extreme high stages. The seriousness of this flooding will be increased by the inadequate capacity of the main sewer during excessive rainfall.

The location of the proposed outlet is unsatisfactory as it is within 50 feet of a main highway, and about 300 feet from a dwelling. The same objection may also be raised to the existing outlet installed in 1910. In order to avoid the possible production of a nuisance near the highway and dwelling, it is necessary that the dry-weather flow from the existing and proposed sewers be conducted to a point about 2,500 feet downstream where Rush Creek is joined by a tributary. This point is at a suitable distance from the highway and dwelling. Above this confluence, Rush Creek and its tributary have a watershed area of 180 square miles, and it will be recognized that this will increase the available dilution.

SUMMARY AND CONCLUSIONS.

From the foregoing report it will be seen that in accordance with the first condition of approval of the water supply, the village of Bremen has through its engineer submitted to the Board plans for a system of sewers to drain all property within 1,000 feet of the water supply wells. The plans provide for a combined system of sewers. During extreme high stages in Rush Creek the sewers near the waterworks property will be filled by back flow from the stream or by surface run-off and sewage. The main outfall sewer is of insufficient size to carry the run-off during excessive precipitation, and this fact increases the seriousness of the danger of pollution of the wells by leachings from the sewers.

This difficulty may be overcome by providing means of pumping the sewage during high stages of the stream. Obviously it is impracticable to attempt the handling of the storm flow in this manner, and therefore a separation of the domestic sewage from the storm flow and means of pumping the former are necessitated.

The principal object to be attained in constructing sewers within 1,000 feet of the waterworks property is to protect the quality of the water supply, and in order to accomplish this it is of the utmost necessity to secure the greatest degree of watertightness possible with modern practice of sewer design and construction. The joints of the sewers should be sealed with a compound which will insure permanent watertightness, and possibly those sewers adjacent to the waterworks property should be constructed of cast iron pipe with leaded joints.

ACTION OF THE BOARD.

At a meeting held April 11th, 1912, the State Board of Health disapproved the plans for a proposed system of combined sewers for Bremen, submitted by Mr. E. R. Johnston, engineer for the village, March 27th, 1912. A copy of the report of the chief engineer upon these plans was furnished the village officials and they were notified that the Board would require that sanitary sewers be constructed in place of the combined sewers proposed, and that plans for a comprehensive system of sanitary sewers be submitted to the Board for approval as soon as such plans can be prepared.

On July 13th, 1912, revised plans for a proposed system of combined sewers for Bremen were submitted by Mr. E. R. Johnston, engineer for the village. After a review of the plans the following report was submitted:

Revised Plans for Combined Sewers. The revised plans of the engineer for the village provide for the installation of a system of combined sewers following the same routes as shown on the plans disapproved in April 1912. The elevation of the sewers is to be raised one foot or more by increasing the grade from a point where the sewerage system con-

nects with the main outfall sewer. The sewers immediately adjacent to the waterworks property will be elevated about 2 feet, and thus the danger of the sewers becoming filled by back water from Rush Creek is almost entirely eliminated. To further protect the water supply wells, it is proposed to use a water-tight compound in sealing the joints of the sewers. To provide for adequate flushing, the flow from a spring, rated by the engineer for the village at 31,000 gallons per day, is to be diverted into the upper end of the Spring Street sewer which passes the northerly line of the waterworks property. It is stated that the flow of the spring will be practically constant during the summer. It is also stated that connections with the waterworks mains may be placed at the head of the Oak and Bartlett Street laterals, if this is found necessary.

The revised plans contain no provision for changing the point of outlet or conveying the dry-weather flow from the sewer to a more suitable location. This extension may not be required at the present time but there is little doubt that it will become necessary as the flow of sewage increases. Also the ultimate necessity of installing sewage purification works must be kept in mind.

The village claims that funds available will not permit of the construction of a separate system of sewers, and furthermore, it is claimed that storm sewers to provide for the drainage of surface water are necessary. The storm sewers are required on account of the flatness of the topography, which prevents rapid drainage of the surface and shallow subsoil. It is intended to pave a number of streets in order to improve general conditions, and this procedure it is claimed will require the immediate installation of storm sewers.

SUMMARY.

From the foregoing report it will be seen that the village of Bremen has not complied with the requirements of the State Board of Health, which provided for the installation of sanitary sewers instead of combined sewers in the district within a radius of 1,000 feet from the public supply wells. The improvements provided in the revised plans include the raising of the system to such an elevation that it will drain freely at all times, including periods of high water in Rush Creek, and the use of special compounds to make the joints of the sewers watertight. Flushing of the Spring Street sewer will be provided by diverting the flow of a spring, and flushing of the Oak and Bartlett Street laterals may be accomplished by installing flush tanks at the head of the Oak Street and Friesner Avenue sewers. In so far as the pollution of the water supply is concerned, the revised plans provide for its protection against pollution. The proposed disposal of the sewage, however, remains the same and recognition must be given to the necessity of relocating an outlet for the dry-weather flow in the near future; also of the necessity of ultimately establishing sewage purification works.

ACTION OF THE BOARD.

At a meeting held July 18th, 1912, the State Board of Health approved the revised plans for a proposed system of combined sewers for Bremen, submitted by Mr. E. R. Johnston, engineer for the village, July 13th, 1912, subject to the following conditions:

1st. That an asphaltic compound or equivalent, satisfactory to the engineer of the State Board of Health, be used to make the joints of all sewers watertight within a radius of 1000 feet from the water supply wells;

2nd. That automatic flush tanks be installed at the head of the Oak Street and Friesner Avenue sewers to prevent the standing of solid matter within the sewers;

3rd. That the village have prepared plans and profiles for an intercepting sewer to carry the dry weather flow of sewage from the existing and proposed outlets to a suitable location for sewage purification works, at least 2500 feet downstream from the proposed outlet; and that this interceptor be constructed when deemed necessary by the State Board of Health; (Submitted Dec. 26, 1912)

4th. That sewage purification works of a design satisfactory to the State Board of Health be installed when deemed necessary by said Board; and,

5th. That this approval shall be considered void unless plans for an intercepting sewer shall have been submitted prior to January 1st, 1913.

The authorities were advised that the State Board of Health does not generally approve of the installation of combined sewers, especially in cases where the purification of the sewage may be required immediately or ultimately; and that the cost and difficulty of operation of sewage purification works are increased when combined sewers are used.

REPORT ON PROPOSED SEWERAGE AND SEWAGE PURIFICATION PLANT FOR BUCKEYE LAKE PARK.

On September 11th, 1912, a general plan of proposed sewerage and the outline of proposed method of sewage purification were received from Mr. A. Elliott Kimberly, consulting engineer for Mr. W. D. Harris, lessee of Buckeye Lake Park. On October 18th, 1912, detailed plans and a description of the proposed treatment plant were submitted by Mr. Kimberly. On September 16th, 1912, the chief engineer visited Buckeye Lake Park and investigated the proposed improvement. The following report was submitted:

Buckeye Lake Park is situated in Licking County on the northerly shore of Buckeye Lake about 28 miles east of the city of Columbus. The park is owned, with the exception of the state reservation immediately around the lake, by the Ohio Electric Railway Company, and is under lease to Mr. W. D. Harris, who acts as manager of the park and maintains a hotel and various amusement establishments. In addition to the park proper there is included a small community of summer cottages,

which lie within the park boundaries. The total area of the grounds is approximately 41 acres, which includes Crane Pond with an area of 10 acres. The frontage along the lake is 2,700 feet. The population at the park is variable, amounting to practically nothing during the winter months and averaging from 1,000 to 4,000 during the regular season. Of this population the majority is transient, and the regular permanent summer population does not exceed 1,000. Immediately adjacent to the park on the north and west are communities of summer cottages, which, however, are in no way connected with Buckeye Lake Park or its organization.

The water supply of the park is obtained from a drilled well several hundred feet deep, which furnishes water of good quality for drinking purposes. It is piped to all buildings within the park grounds, including the summer cottages within the park. No buildings outside the park are at present supplied with water from this source.

The sanitary conditions at the park have for a number of years been extremely objectionable, especially as regards the disposal of sewage. In July 1912, representatives of the State Board of Health made an examination of the conditions at the park, and later the authorities were required to submit plans for comprehensive improvement in sanitary conditions, especially as regards the disposal of sewage, prior to the October meeting of the Board.

At a meeting of the State Board of Health held September 12th, 1912, the general plan for proposed sewerage and outline of proposed method of sewage purification, submitted September 11th, 1912, were referred to a committee comprising Mr. John W. Hill, member, and Mr. W. H. Dittoe, chief engineer. The committee was empowered to act upon the general project as proposed by the consulting engineer. Following the investigation by the committee on September 16th, 1912, the general project comprising the following features, was approved September 21st, 1912:

1st. Screening and sedimentation in a covered, reinforced concrete settling tank having a capacity equivalent to a 12-hour period of retention. (Capacity 16,000 gallons.)

2nd. Disinfection of the settled sewage with chlorite of lime.

3rd. Pumping the settled and disinfected sewage into—

4th. A line of 8-inch vitrified sewer pipe, which shall extend to the north in the center of the right-of-way of the Ohio Electric Railway, for a distance of about 5,500 feet, discharging into the South Fork of the Licking River at the south and west side of the long trestle which spans the above stream. The sewer is to be laid on a grade of 0.2 per cent, that is, 2 feet per 1,000 feet.

This approval was subject to the condition that devices for secondary treatment of the sewage be installed when deemed necessary by the State Board of Health, and that complete detailed plans be submitted

to the State Board of Health for its consideration prior to October 15th, 1912.

Proposed Sewerage. The general plan of proposed sewerage provides for the installation of a fairly complete system of sanitary sewers to be constructed of 8-inch vitrified pipe with closed joints, and provided with manholes at changes of grade and direction. The minimum grade of the sewer will be 0.42 per cent, which will furnish a self-cleansing velocity. All sanitary fixtures within the park will be connected to the system. The outlet of the system is restricted on account of the topography to a limited area within the central portion of the park. It appears impossible for the owners of the park to obtain a suitable site for purification works outside the grounds, and the conditions, therefore, require that the plant for the sewage purification be placed within the park and designed so as to avoid nuisance if placed near habitations. It is, therefore, proposed to construct the sewerage system and the sewage purification plant near the central portion of the park grounds and to carry the effluent line to a suitable outlet.

Proposed Sewage Purification Plant. The plans of the consulting engineer provide for the purification of the sewage by screening, sedimentation, and disinfection. The screen chamber will be a rectangular concrete structure, 4 by 5 feet in plan and 2 feet deep, containing an iron bar screen with open spaces of one inch. The chamber is covered by a plank roof, which will be flush with the surface of the ground.

The sedimentation tank will be of reinforced concrete construction, and will be covered with a concrete roof which will be flush with the surface of the ground. Three manholes are provided in the roof to furnish access to the tank. The sedimentation tank is 25 feet by 12.5 feet in plan, 8 feet deep at the inlet, and 6 feet deep at the outlet. Its capacity is, therefore, 16,000 gallons, which on a basis of 24,000 gallons sewage flow in 16 hours, will provide 10.6 hours period of retention. A baffle at the inlet and a scum board at the outlet are provided to distribute the flow.

The effluent from the tank passes over a 12-inch weir and enters a pump and disinfection well. As the effluent enters the pump well it will be treated with hypochlorite of lime in an amount equivalent to 7.5 parts per million available chlorine. The disinfection apparatus consists of two cypress solution tanks of 92 gallons' capacity each, and an orifice box to feed the solution.

The pump and disinfection well is a reinforced concrete structure, covered with a concrete roof, and adjoins the sedimentation tank. It is 12.5 feet square and 8 feet in depth to the over-flow, and thus has a capacity of 9,300 gallons. A wooden superstructure will be built over the pump well in which will be housed the pumping machinery and disinfection apparatus. The sewage will be pumped by means of a centrifugal pump electrically driven for a capacity of 75 gallons per minute. In case

of failure of the pump, the sewage will overflow to an existing drain which empties into Waste Weir Run. Estimating that the pump will operate at its rated capacity, it will be working three hours and resting two hours when the sewage flow is at a rate of 24,000 gallons in 16 hours.

The pump discharges through a 3-inch wrought iron pipe to a man-hole located in the center of the right-of-way of the Ohio Electric Railway. From this point an 8-inch vitrified pipe line 5,500 feet in length will convey the pumped effluent in a northerly direction to the south fork of the Licking River. The outlet will be placed at the south end of the railroad trestle and will be protected by a concrete bulkhead. An iron pipe will be extended to the main portion of the stream and submerged.

The south fork of the Licking River has a watershed area upon the proposed outlet of 70 square miles to an estimated minimum flow of 2 cubic feet per second. Near and below the point of outlet the stream passes successively through fairly-deep pools of shallow riffles where aeration will be promoted. The stream enters the Licking River at Newark about 10.5 miles below the outlet.

ACTION OF THE BOARD.

At a meeting held October 23rd, 1912, the State Board of Health approved the general plan of proposed sewerage and the detailed plans for a proposed sewage purification plant for Buckeye Lake Park, submitted by Mr. A. Elliott Kimberly, consulting engineer for Mr. W. D. Harris, lessee of the park, on September 11th, and October 18th, 1912, respectively, subject to the following conditions:

- 1st. That the installation be enlarged, or devices for secondary treatment of the sewage be installed, when deemed necessary by the State Board of Health;
- 2nd. That the authorities of Buckeye Lake Park employ a competent operator to attend to the disinfection and pumping of the sewage;
- 3rd. That the sludge be removed from the sedimentation tank at least once each year and properly disposed of by burial;
- 4th. That duplicate pumping equipment be installed if the failure of the proposed unit should necessitate the bypassing of the settled sewage to Waste Weir Run; and,
- 5th. That this approval shall be void unless the proposed installation shall have been made prior to June 1st, 1913.

REPORT ON PROPOSED SEWERAGE AND SEWAGE PURIFICATION FOR THE MILES-CORLETT ALLOTMENT OF THE CAINE REALTY COMPANY, CLEVELAND.

On November 16th, 1912, Mr. R. Winthrop Pratt, consulting engineer for The Caine Realty Company, submitted plans for proposed sewerage and sewage purification for the Miles-Corlett Allotment of The Caine Realty Company at Cleveland. Previous to the submission of these

plans, one of the assistant engineers visited Cleveland on November 15th, 1912, and investigated the proposed improvement. The following report was submitted:

The Miles-Corlett Allotment of The Caine Realty Company is located in the extreme south-easterly portion of the city of Cleveland. Mill Creek, a tributary of the Cuyahoga River, passes through the extreme south-easterly portion of the allotment. The average elevation is 300 feet above Lake Erie, and the major portion of the allotment is of such elevation that it will drain to the city sewers. A small low-lying portion, however, cannot be drained in this manner and it is necessary to provide independent sewerage and sewage purification for this district. This low-lying portion borders Mill Creek which will receive the drainage. Mill Creek is a small stream, but owing to its steep banks and the absence of dwellings near its course, might receive untreated sewage without giving rise to complaint. However, to insure against any complaint it is proposed to install a plant to treat the sewage.

The low-lying portion for which the proposed system is to be installed comprises 43 lots, which, if completely built up, will represent a population of 200. It is estimated, however, that not over 100 persons will become tributary to the proposed sewers within a period of five years. It is upon this basis that the sewage purification plant is designed. It is expected also that within a period of five years the city of Cleveland will provide sewers which will make possible the entire abandonment of the plant.

Briefly, the plans of the consulting engineer provide for the installation of about 1,100 feet of sanitary sewers, and a sewage purification plant comprising an Imhoff tank, a dosing chamber, and two intermittent sand filters. The site selected for the purification plant is not well removed from future dwellings, but its unsatisfactory location is realized and odors will be avoided by covering all of the devices. The site is furthermore somewhat unsatisfactory on account of its topography. An available head of only 4.6 feet is provided.

The sedimentation tank is a brick concrete structure 9 feet in diameter by 11 feet 6 inches deep and is constructed with two compartments, one for the sedimentation of the sewage, and the other for the digestion of the sludge. It will be covered by 3-inch plank hinged doors. The sedimentation compartment is of wooden construction and extends across the upper portion of the tank. It is 4 feet in width, 6 feet 2 inches in length, and 4 feet in depth in the straight. Below this a false bottom with a V section is placed, the apex being 6 feet 8 inches below the top of the tank. The capacity of the compartment is 525 gallons, which, on a basis of 3,000 gallons per day, will provide a retention period of 4.2 hours. A baffle at the inlet end and a scum board at the outlet will provide proper distribution of the sewage. Along the entire length of the apex of the false bottom a slotted opening 6 inches wide is placed, which provides

for the passage of the sludge into the sludge compartment below. This has a capacity of 675 gallons or 90 cubic feet, and in the deepest portion the sludge will be digested at a depth $8\frac{1}{2}$ feet below the flow line. This depth will not produce the highly efficient digestion provided by a deeper tank. The sludge may be removed during the operation of the tank through a 6-inch sludge line. No sludge filter is provided in the plans for the drying of the sludge. This is an essential feature and should be incorporated.

The tank effluent enters a brick dosing chamber 3 feet 6 inches in diameter. The dosing chamber is closed with a cast iron manhole cover. The capacity of the dosing chamber is increased by two 15-inch pipe extensions, each 30 feet in length. The combined capacity of the dosing chamber and the laterals is 534 gallons, which will flood the filter unit to a depth of 2 inches. A 3-inch automatic siphon is provided to dose the filters.

Two intermittent filters, each 17 feet by 31 feet in plan, with a total area of 10.54 square feet, are provided. Owing to the limited head only two feet of filtering material can be used, which is specified to consist of sand. The sewage is discharged on to the filters through surface distributors. The discharge from the dosing chamber may be diverted to either of the two units by hand operated stop planks in a gate chamber placed in the effluent line from the dosing chamber. The effluent is collected in the underdrains and discharged into Mill Creek. The filters are to be covered by a wooden roof.

ACTION OF THE BOARD.

At a meeting held November 21st, 1912, the State Board of Health approved the plans for the proposed sewerage and sewage purification for The Miles-Corlett Allotment of The Caine Realty Company of Cleveland, submitted by Mr. R. Winthrop Pratt, consulting engineer, on November 16th, 1912, subject to the following conditions:

- 1st. That a sludge filter, satisfactory to the Engineer of the State Board of Health, be provided for the drying of the sludge removed from the tank.
- 2nd. That samples of the filtering material be submitted to and approved by the Engineer of the State Board of Health before it is placed.
- 3rd. That The Caine Realty Company employ a caretaker to visit the plant at least twice each week and attend to its proper operation.
- 4th. That the entire plant be abandoned and removed as soon as sanitary sewers for the district shall have been constructed by the city of Cleveland.
- 5th. That this approval shall be considered void unless the proposed sewerage and sewage purification plant shall have been constructed prior to June 1st, 1913.

REPORT ON PROPOSED SANITARY SEWERS FOR SEWER DISTRICT NO. 3, CANAL DOVER.

On May 27th, 1912, plans and profiles for proposed sanitary sewers for Sewer District No. 3, Canal Dover, were submitted to the State Board of Health for approval. On July 8th, 1912, a general sewerage map of the city showing existing and proposed sanitary sewers accompanied by a formal request for approval of the proposed sewers, was received from Mr. Charles H. Krantz, director of public service. On May 27th, 1912, one of the assistant engineers visited Canal Dover and made an examination of the existing sewerage and proposed improvements. The following report was submitted:

Canal Dover, a city with a population of 6,621 in 1910, is located in Tuscarawas County in the valley of the Tuscarawas River just above its confluence with Sugar Creek. The city is largely built upon the bottom land in the valley of the river, which is bordered on both sides by rather elevated ground. The city lies on both sides of the river, the smaller portion on the southerly side having a population of about 800. This is devoted to manufacturing interests and is not extensively built up.

In the way of municipal improvements the city is provided with paved streets, a system of separate sewers, and a public water supply obtained from driven wells in the valley of the river southeast of the city.

PREVIOUS ACTION OF THE BOARD.

In 1900 plans for a proposed system of sanitary sewers, with an outlet into the Tuscarawas River at a point below the C. & P. Railroad bridge and between the canal and the river, were approved by the Board "subject to the condition that the village of Canal Dover, whenever required to do so by the State Board of Health, should purify its sewage in a manner satisfactory to said Board." Following this approval, approximately 4.6 miles of sewers were constructed in 1902. About four years ago some 3.8 miles of sanitary sewers, comprising Sewer District No. 3, were constructed without receiving the approval of the State Board of Health. These sewers, however, did not involve the establishment of a new outlet.

EXISTING SEWERAGE.

The present sewerage includes about 5,000 feet of storm sewers discharging into the Ohio Canal, and approximately 3.4 miles of sanitary sewers. The sanitary sewers are located entirely in that portion of the city lying north of the river and discharge through a single outlet 18 inches in diameter, a short distance west of the C. & P. Railroad bridge, which is the location shown on the plans approved in 1900. The outlet is submerged at all times by the backwater formed by a dam in the river located one and one-half miles below the outlet. The pool formed by this dam extends to a point two miles above the outlet. No investigations

have been made by the State Board of Health showing that the discharge of sewage from Canal Dover produces a nuisance in the Tuscarawas River.

PROPOSED ADDITIONAL SEWERAGE.

The plans of the city engineer provide for the extension of the existing sewerage system by the installation of sewers in Sewer District No. 3, which is located in the extreme northerly portion of the city. This district is at present sparsely populated but with the increasing growth of the city will undoubtedly soon become built up. The extent of the proposed additional sewerage is shown by the following list of sewers to be constructed:

12-inch or larger.....	2,400 feet
12-inch	1,800 feet
10-inch	2,175 feet
8-inch	13,275 feet

Total 19,650 feet or 3.7 miles

The present population of the district is 960 and the ultimate population will reach 2,500. One hundred and fifty house connections will probably be made within a year after the sewers have been completed, and ultimately 500 or more connections will be installed.

The plans of the city engineer do not include any provision for purification of the sewage from the proposed and existing sewers, and it is proposed to continue the discharge of untreated sewage into the Tuscarawas River. The present condition of the Tuscarawas River, as related to the disposal of sewage from cities on its watershed, will be briefly discussed.

Tuscarawas River. The Tuscarawas River joins the Walhonding River at Coshocton to form the Muskingum River. Above the confluence it has a watershed area of approximately 2,219 square miles, while that of the Walhonding is about 2,490 square miles. Above Canal Dover the Tuscarawas River has a watershed of about 1,400 square miles, upon which are located a number of cities and numerous small villages. The total population of the watershed is approximately 184,000, representing 132 per square mile. This is probably as high a figure as obtains upon any large watershed in the state. The population is about evenly divided between urban and rural. The principal communities having populations of 3,000 or more and the existing method of disposal of their sewage are as follows:

Location.	Population.	Miles by water above Canal Dover.	Disposal of Sewage.
Wadsworth	3,000	57	Purified
Orrville	3,000	60	Purified
Barberton	9,400	50	Untreated
Massillon	13,900	30	Untreated
Canton	50,000	34	Purified

Plans are in process of preparation for a new sewage purification plant at Canton. The discharge of sewage at Massillon creates an objectionable condition in the Tuscarawas River at times of low flow, and the installation of purification works is needed. No reports are on file to indicate pollution resulting from the discharge of untreated sewage at Barberton. New Philadelphia, with a population of 8,542, and Newcomerstown, with a population of 2,943, are located on the Tuscarawas River 3 miles and 34 miles, respectively, below Canal Dover. New Philadelphia is at present engaged in the construction of sanitary sewers and will install purification works before the sewers are placed in use. Newcomerstown had plans prepared in 1903 for a system of sanitary sewers and purification works, and there is now agitation to proceed with the construction of the sewers and purification works. Coshocton, with a population of 9,603 is located immediately below the confluence of the Walhonding and Tuscarawas Rivers, 47 miles below Canal Dover. Additional sanitary sewers are in process of construction and the city is about to engage an engineer to design sewage purification works to treat the flow from the entire city. Twenty-nine miles below Coshocton on the Muskingum River is the city of Zanesville with a population of 28,026, discharging its untreated sewage into the river. Disposal by dilution at this point has thus far caused no nuisance.

On the Walhonding River watershed are located the following communities:

<i>Locality.</i>	<i>Population.</i>	<i>Disposal of Sewage.</i>
Wooster	6,136	Untreated
Mansfield	20,768	Purified
Mt. Vernon	9,087	Untreated
Ashland	6,795	Purified

From the foregoing discussion of the conditions on the watershed of the Tuscarawas River, it will be noted that most of the principal cities have already undertaken the installation of treatment plants for the disposal of their sewage. The Muskingum River is at present not seriously polluted by the sewage from the various communities, and even during extreme low flow no very serious nuisances are created. However, it is apparent that with the increasing population upon the watershed of the stream, it is necessary to take every precaution to prevent the production of unsanitary conditions in the stream.

SUMMARY.

From the foregoing report it will be seen that the city of Canal Dover installed sanitary sewers in 1902 according to plans approved by the Board in 1900 with the condition that the sewage be purified when required by the State Board of Health. In 1907 or 1908 additional sewers were built without the approval of the State Board of Health, and it is

now proposed to extend the existing system of sanitary sewers by constructing sewers in Sewer District No. 3. A study of the Tuscarawas River watershed shows that it is thickly populated and that the principal cities have taken steps to purify their sewage. This has been done largely at the direction of the State Board of Health. The examination of May 27th, 1912, did not indicate that a decided nuisance is caused by the discharge of sewage from Canal Dover, but no inspection has been made during extreme low flow of the stream to determine the conditions created at such time. It must also be kept in mind that with a constant increase in the sewage flow at Canal Dover, there will be a likelihood of creating a nuisance in the Tuscarawas River. Apart from the consideration of whether there is a decided nuisance created, it appears reasonable to demand that the city of Canal Dover purify its sewage before discharging it into the Tuscarawas River.

ACTIONS OF THE BOARD.

At a meeting held July 18th, 1912, the State Board of Health considered the plans for proposed sanitary sewers for Sewer District No. 3, Canal Dover, prepared by the city engineer, Mr. George E. Arnold, and submitted by Mr. Charles H. Krantz, director of public service, on May 27th and July 8th, 1912. The Board voted to withhold its approval of these plans, and to advise the authorities that the plans for sanitary sewers for Sewer District No. 3 were in general satisfactory, but plans for a sewage purification plant satisfactory to the State Board of Health must be submitted to said Board before approval of the sewers would be granted.

At a meeting held August 15th, 1912, Mr. J. B. T. Bold, city solicitor of Canal Dover, appeared before the State Board of Health and requested approval of plans for sewers for District No. 3. The Board reconsidered its action of July 18th, 1912, withholding approval of the plans for proposed sewerage for District No. 3, and voted to approve sewers for District No. 3, provided plans for sewage purification be presented to the State Board of Health for approval within ninety days from date, or by November 15th, 1912.

On November 12th, 1912, a communication was received from Mr. Charles H. Krantz, director of public service, requesting that the Board extend the time for the submission of plans for a sewage purification plant to January 15th, 1913.

October 23rd, 1912, the principal assistant engineer visited Canal Dover and examined two sites proposed for the location of the sewage purification plant. The examination revealed the fact that either site might be satisfactory, depending upon the type of plant used, but that no definite choice of a site should be made until a further study of the problem of sewage treatment was made and determination of the type

of plant reached. The director of public service was advised that this study should be made.

In connection with the general improvement, including sewage treatment, the city was also required to construct sewers in that portion of the city south of the Tuscarawas River, provided for by the State Board of Health in its action of August 15th, 1912, approving a proposed additional water supply for the city, with the condition that sanitary sewers be installed in the district within 1,000 feet of the wells. It was desired by the local officials to present plans for these sewer extensions as a part of the general improvement.

It was thought that the extension of the time limit of the approval of sewers for District No. 3, could not affect the pollution of the Tuscarawas River, as the construction of the proposed sewers would probably not be completed before the spring of 1913, at which time work might be started in the construction of a sewage purification plant; and it was essential that the city be given sufficient time to have the question of sewage treatment thoroughly studied by a sanitary engineer before definite plans were drawn.

At a meeting held November 21st, 1912, the State Board of Health voted to grant this request, and revised the approval given August 15th, 1912, to read as follows:

"That the plans for proposed sewerage for District No. 3 be approved provided plans for sewage purification be presented to the State Board of Health for approval prior to January 15th, 1913."

REPORT ON PROPOSED SEWERAGE FOR CANAL FULTON.

At a meeting held September 14th, 1911, the State Board of Health disapproved the plan for constructing sewers in Canal Street, as shown on plan prepared by Mr. F. E. Myers, consulting engineer, and submitted on August 16th, 1911, and it was further voted to require the village to either postpone construction of sewers or cause to be prepared plans, satisfactory to the State Board of Health, for a comprehensive sewerage system, including purification works.

In a report to the Board the Engineering Committee recommended that the disapproval include a suggestion that a general system of sanitary sewers be designed in order that any short sewers installed at present might form a portion of the ultimate system.

On January 26th, 1912, revised plans and profiles for a comprehensive system of sanitary sewers, including sewage purification works were submitted by Mr. F. E. Myers, consulting engineer for the village. The plans were reviewed by the acting chief engineer and the following report submitted:

Canal Fulton is located in the northwestern part of Stark County on the Tuscarawas River. The present population is about 1,000. The village is supplied by a privately owned water works company, but has no other municipal improvements. At the present time there are no sanitary sewers, although a number of short storm sewers have been installed in various portions of the village. Most of these discharge into open ditches, which in turn empty into the Ohio Canal or the Tuscarawas River.

Plans have been recently prepared for paving the main street of the village, and it is desired to install sanitary sewers in this street at the same time the pavement is laid to avoid future difficulty of construction.

Briefly, the plans of the consulting engineer provide for the ultimate construction of four miles of sanitary sewers, which will practically cover the village, and a sewage purification plant. The system is designed so that the flow from the sewers will reach a low point a short distance southwest of the center of the village near the Cuyahoga River. From this point a trunk sewer 12 inches in diameter will ultimately convey the sewage to the purification works. The location of the proposed purification works, as shown on the plans submitted, is between the Tuscarawas River and the Ohio Canal about 2,000 feet south of the central portion of the village. The plans for the purification plant have not been prepared in detail, but the general plans provide for the installation of a screen chamber, two settling tanks, a pump well, a dosing tank, and intermittent sand filters. The sedimentation tanks are each 45 feet in length and 5.6 feet deep to the invert of the sewer and are 7 feet and 8 feet in width, respectively. Their capacities to the sewer level are, therefore, 13,000 gallons and 15,000 gallons, respectively. With an ultimate sewage flow of 100,000 gallons per day, there will be 6.7 hours retention by the two tanks operated together. The sewage will flow from the tanks into a pump well from which it will be intermittently pumped to the sand filters. The walls of the tanks, screen chamber, and pump well are carried to a point $3\frac{1}{2}$ feet above the level of the ground or one foot above high water level of the Tuscarawas River. The sand filters consist of 4 units of $\frac{1}{4}$ acre each, arranged in a rectangle, at the center of which the dosing tank is to be placed. The filters are to be constructed on a fill so that the underdrains will be at high water level. The filtering material will consist of sand with a depth of 3 feet. The effluent will be conducted to the Tuscarawas River which flows nearby.

While comprehensive plans for sewerage have been prepared, it is the intention at present to construct but a small portion of the system. It is proposed to build one line of sewer, 720 feet in length along Canal Street and 480 feet in length along Poplar Street to its outlet in the Tuscarawas River at the foot of this street. The sewers will be 8 inches and 10 inches in diameter and are designed as a portion of the system to

be ultimately constructed. A flush tank at the upper end of the sewer will provide for its proper cleansing. The plans provide for the discharge of the sewage at about the mean level of the stream, and it is the intention to protect the outlet by a concrete bulkhead.

The outlet is located about 240 feet below the Cherry Street bridge, which is the nearest thoroughfare, and at the present time there are no houses within 250 feet of the proposed outlet. The Tuscarawas River has a watershed area above Canal Fulton of about 375 square miles, and the dry weather flow is sufficient to afford a high dilution of the sewage which would be contributed by the proposed sewer. No community below Canal Fulton obtains its water supply from the river. The sewer will be used to a small extent for domestic sewage and it is probable that not more than ten connections will be made for several years. No nuisance will result in the discharge of sewage from this outlet if only the proposed short sewer is tributary and if proper precautions are taken to secure good dispersion in the stream. However, with the establishment of this outlet the possibility of future sewers becoming tributary should be recognized by the Board in its action. Although the location of the outlet will not be objectionable unless future additional sewers are made tributary, it would appear advisable that this condition be anticipated and a more remote location be secured for the present temporary outlet.

ACTION OF THE BOARD.

At a meeting held February 15th, 1912, the State Board of Health approved the revised general plan and profiles for a comprehensive system of sanitary sewers including purification works, submitted by Mr. F. E. Myers, consulting engineer, on January 26th, 1912, subject to the following conditions:

1st. That the approval of the proposed location of the sewage purification works be withheld;

2nd. That detailed plans of the purification works including its location, be submitted to and receive the approval of the State Board of Health prior to its installation; and,

3rd. That this approval be void unless construction of the sewers and sewage purification works be completed prior to January 1st, 1917.

The plans for a sewer extending 720 feet in Canal Street and 480 feet in Poplar Street, with a temporary outlet into the Tuscarawas River, were approved with the following conditions:

1st. That the outlet be located at least 300 feet below Poplar Street and carried into the current of the stream and placed at such elevation as to be submerged at all times;

2nd. That no new sewers be made tributary to this outlet until plans for the same shall have been submitted to and approved by the State Board of Health.

3rd. That sewage purification works be constructed when deemed necessary by the State Board of Health.

4th. That an accurate record of all connections to the sewers be maintained.

5th. That this approval be void unless the construction shall have been completed prior to November 1st, 1912.

REPORT ON RECONSIDERATION OF PROPOSED SEWERAGE FOR DISTRICT NO. 4, CANTON.

At a meeting of the State Board of Health held September 14th, 1911, plans for proposed sewerage for District No. 4, Canton, submitted by Mr. P. H. Weber, city engineer, August 16th, 1911, were considered and were disapproved until such time as the city commenced the construction of a new sewage purification plant to be located on a site satisfactory to the State Board of Health.

Following receipt of the notification of the Board's action the city took steps to secure a site for the new purification plant, and on October 7th, 1911, the director of public service submitted a plan showing a proposed site for the plant. At a meeting of the State Board of Health held October 18th, this site was approved, said site being located about three miles south of the center of the city of Canton and one mile south of the existing sewage purification plant.

Following the approval of this site, the city officials desired to proceed with the construction of sewers in District No. 4 without first providing the new sewage purification works, and at a meeting of the Board held November 21st, 1911, a delegation from Canton requested reconsideration of the Board's former action disapproving the sewers for District No. 4. The Board's action upon this request was to refer the matter to the engineering committee for further investigation and report.

Later, the matter being referred to the chief engineer, the following report was made:

From the information available it does not appear that the city of Canton has taken any decided steps to construct the new sewage purification works, and beyond the securing of a small tract of land, nothing has been done in this direction. Undoubtedly sewers are needed in District No. 4, which covers an area of one-half square mile or more, and has a present population of 2,000.* The future growth within the district will probably be flourishing and an ultimate population of 8,000 or more may be expected. At the present time the sewage purification works are heavily overworked and are operating under a court order, with the use of chemicals to promote sedimentation. The disposal of the sludge, however, offers extreme difficulty and creates objectionable conditions in the vicinity of the plant. There are now a number of damage suits pending against the city of Canton for the pollution of Nimishillen Creek and no doubt the existence of these suits will tend to hasten the construction of the sewage plant. Considering the already overburdened condition of the plant it is evident that no additional sewage should be permitted to become tributary.

The question of installing the sewers for District No. 4 is somewhat complicated by the fact that the city officials have proceeded with the

issuance and sale of bonds for the improvement and are, therefore, desirous of using the funds immediately. This procedure has, however, been entirely unwarranted, inasmuch as the approval of the State Board of Health should have been secured prior to such action.

ACTION OF THE BOARD.

At a meeting of the State Board of Health held January 17th, 1912, this report was considered.

In view of the already overburdened condition of the sewage purification works the Board deemed it improper to permit the proposed additional sewers of District No. 4 to become tributary until a new plant is provided and it therefore voted to sustain its former action of September 14th, 1911, disapproving the plans for sewerage for District No. 4 until such time as the city commenced the construction of a new sewage purification plant to be located on a site satisfactory to the State Board of Health.

On March 21st, 1912, a delegation from Canton consisting of Mr. Ray F. Harbert, director of public service, Mr. John T. Blake, city solicitor, Mr. Phil. H. Weber, city engineer, and Mr. Louis B. Ohliger, superintendent of water works, appeared before the Board and requested that the Board reconsider its action in disapproving proposed sewerage for District No. 4, Canton. The matter was referred to a committee of the Board consisting of Mr. John W. Hill, engineering committee, Mr. Josiah Hartzell, member, and Mr. W. H. Dittoe, chief engineer. On April 8th and 9th, 1912, the committee visited Canton and made a general examination of sewerage conditions.

The following report was submitted:

District No. 4, for which the proposed new sewers are to be provided, is located in the extreme southwesterly portion of the city, occupying that area south of the Pittsburg, Fort Wayne and Chicago Railway and west of Nimishillen Creek. It contains a number of manufacturing industries, the presence of which will assist the growth of population within the district. The district is at present entirely unprovided with sanitary sewerage facilities but water main extensions have been made to practically all portions of the district. The streets are unpaved and are poorly drained although storm sewers have been constructed. One of the arguments presented by the local officials favoring the immediate construction of sanitary sewers is the necessity of street paving, which must await the installation of the sewers.

Briefly, the proposed sewer system consists of 8.5 miles of vitrified pipe distributed as follows:

31,724 feet of 8-inch pipe
4,500 feet of 10-inch pipe

1,360 feet of 15-inch pipe
3,043 feet of 18-inch pipe
2,532 feet of 20-inch pipe
665 feet of 14-inch cast iron pipe for inverted siphons.

The main sewer from the district will cross Nimishillen Creek opposite the present sewage purification plant by means of a 14-inch inverted siphon and will connect with the existing main outfall sewer leading to the plant.

The considerations which have been given to this proposition in former reports have recognized the present condition of the sewage purification plant and its total inadequacy to properly treat the sewage flow from the city. It was correctly thought that before any marked increase in sewage flow should be permitted, some comprehensive improvement in the method of treating the present flow should be made. The recent study of local conditions by the committee, however, indicates that there is some advantage to be obtained in installing sewers in District No. 4 at this time. During the first two years after the system is completed there will probably be comparatively few connections made for the removal of domestic sewage. Almost all of the manufacturing industries will connect with the sewers immediately, but this will not alter the pollution of Nimishillen Creek as these plants have private sewers discharging at various points into the stream. The installation of sewers in the district will make possible the rapid improvement of sanitary conditions by permitting of proper drainage, the construction of paved streets, and a general improvement in the cleanliness of the district. With the installation of sewers, however, it must be recognized that a continued increase in the use of modern plumbing conveniences will occur, and the resulting increase in sewage flow must be foreseen and provided for by the construction of a new sewage purification plant. If no unreasonable delays occur, a new sewage purification plant should be installed before the sewage flow from District No. 4 appreciably increases the sewage flow from the city.

ACTION OF THE BOARD.

At a meeting held May 9th, 1912, the State Board of Health reconsidered its former action (September 14th, 1911) disapproving proposed sewerage for District No. 4 at Canton, as shown on plans submitted by Mr. P. H. Weber, city engineer, August 15th, 1911, and voted to approve the same subject to the following conditions:

1st. That before connections to the proposed sewers are made, complete detailed plans for a new sewage purification plant be submitted to and receive the approval of the State Board of Health;

2nd. That the new sewage purification plant be completed and placed in operation prior to January 1st, 1914; and,

3rd. That this approval be void unless complete detailed plans for a new sewage purification plant shall have been submitted to the State Board of Health prior to September 1st, 1912.

REPORT ON RECONSIDERATION OF PROPOSED SITE FOR SEWAGE PURIFICATION FOR CANTON.

On October 7th, 1911, the director of public service of Canton, submitted a plan showing a proposed site for the sewage purification plant. At a meeting of the State Board of Health held October 18th, 1911, this site was approved, the said site being located about three miles south of the center of the city and one mile south of the existing sewage purification plant.

Subsequent to this approval the following protests were received from various organizations within and near the city of Canton, and it was requested that the Board reconsider its action and insist upon a site farther removed from the city.

The Business Men's Association, signed by Harry Weiss, President, and Louis E. Deuble, Secretary, January 24, 1912.

The Canton Board of Trade, signed by C. A. Dougherty, President, January 27, 1912.

Residents between Canton and North Industry, signed by thirty-six petitioners, received February 12, 1912.

Citizens of North Industry, signed by fifty-one petitioners, received February 12, 1912.

The Canton Medical Society, signed by Dr. J. G. Lawrence, Secretary, received February 13, 1912.

These petitions varied somewhat in their statements but each petition set forth the desirability of selecting a location for the sewage purification plant at a point some distance south of the site approved October 18th, 1911.

At a meeting held February 15th, 1912, the State Board of Health voted to require the city of Canton to submit plans showing the general type of purification works proposed and to defer action until these plans had been submitted and it was determined whether or not the proposed plant could be constructed on the site selected without detriment to those living or owning property in the neighborhood.

At a meeting of the Board held March 21st, 1912, the following committee was appointed to investigate the proposed sites for sewage purification for Canton with a view to reconsideration of the Board's action of October 18th, 1911, approving a site proposed at that time: Mr. John W. Hill, engineering committee, Mr. Josiah Hartzell, member,

and Mr. W. H. Dittoe, chief engineer. On April 8th and 9th, 1912, the committee visited Canton and inspected the present sewage purification plant, the site proposed by the city officials, and an alternate site suggested by various business and professional organizations of the city. Previous to the inspection, on April 8th, the committee heard representatives of the various organizations and of the city government regarding the relative merits of the sites proposed. The following report was submitted:

The present sewage purification plant at Canton is located in the extreme southerly portion of the city a short distance from the southerly corporation line on Nimishillen Creek. The plant is entirely inadequate to properly treat the sewage of the city and is a nuisance to the surrounding residents. Although the growth of the city in a southerly direction has been slow, there are a number of dwellings within 1,000 feet of the plant and the owners of these dwellings protest against the nuisance created. Also the stream is seriously polluted during dry weather and this is made the basis for several damage suits which have been instituted against the city. In September, 1911, the State Board of Health disapproved of proposed sewers for District No. 4 "until such time as the city has commenced the construction of a new sewage purification plant to be located on a site satisfactory to the State Board of Health."

For these various reasons the city has proceeded to secure a suitable location for sewage purification works with the view of submitting to the people the question of the issuance of sufficient bonds to construct a new plant.

Arguments presented to the committee on April 8th, 1912, by representatives of the Business Men's Association, the Board of Trade, and the Canton Medical Society, protested against the location of the plant on the site approved and set forth three principal reasons why this site should not be used. It was claimed first, that the site is in too close proximity to the present corporation line of the city of Canton; second, that the site lies between Canton and North Industry which with the natural growth of the city will become connected unless the presence of a sewage purification plant prevents this; and third, that the site is adjacent to the most desirable locations for manufacturing industries to be constructed in the future. It will be noted that these objections largely consider the depreciation of land which will result in the location of the plant at the point approved.

On April 9th, opinions of the petitioners residing in North Industry and between Canton and North Industry were heard and it would appear that the principal objections to the location of the sewage purification plant above North Industry raised by these petitioners is due to a general opinion that the effluent from any sewage purification plant which might be constructed will seriously pollute the stream and cause odors to arise from it.

DESCRIPTION OF SITES.

The committee inspected two sites which are available for the location of sewage purification works. The first site inspected is that approved by the Board in October, 1911, which site is located between the city of Canton and the unincorporated community of North Industry. The other site inspected is one suggested by the various organizations of the city as being most suitable, and this site is located some three miles south of the first site. For convenience these sites may be designated as No. 1 and No. 2.

Site No. 1. This site is located in the valley of Nimishillen Creek, its northerly boundary being 3 miles south of the center of Canton and 1 mile south of the southerly corporation line, and its southerly boundary $\frac{3}{4}$ mile above North Industry. The site lies between the stream and the B. & O. Railroad, and is approximately $\frac{1}{2}$ mile long and has an average width of some 400 feet. The surrounding country is sparsely settled although there are a few scattered dwellings within $\frac{1}{4}$ mile of the site. The main road from Canton to North Industry lies about $\frac{1}{8}$ mile west of the site, and it is probable that this road will eventually become built up with dwellings. It appears unlikely, however, that such development will take place within twenty years. North Industry lies $\frac{3}{4}$ mile south of the site, and Nimishillen Creek passes directly through the community. With a northerly wind, odors from the sewage purification plant may be carried to North Industry, but inasmuch as the prevailing winds are southwesterly, a nuisance arising from this cause would be occasional. The principal objection that will be apparent to the residents of North Industry is the contamination of the stream by an improperly purified effluent. The preliminary plans contemplate the construction of deep sedimentation tanks and contact filters, using cinders for filtering material, and with proper construction and operation of such a plant a stable effluent will be produced at all times.

Site No. 2. This site is located about 3 miles below site No. 1 on the east side of Nimishillen Creek. It is 6 miles south of the center of the city of Canton, 4 miles south of the southerly corporation limits, and about 2 miles south of North Industry. Howenstine, a small community, is located $\frac{1}{4}$ mile north of the site, and Sparta, with a population of several hundred, is located $2\frac{3}{4}$ miles south of the site. This site presents the same advantages for the construction of sewage purification works as does site No. 1. The sewage may be conveyed by gravity to the site, although it is suggested by the city officials that the rock formations would prohibit the expense necessary for this construction. In such case, pumping would be required. The country surrounding the site is very sparsely inhabited and there would probably be no complaint from odors arising from the plant. Howenstine would suffer from the odors carried by the prevailing winds, but below the plant no objections would arise.

It should be noted that at no point between site No. 1 and site No. 2 does the valley of the creek widen sufficiently to permit the location of a plant of any type. It is apparent that the choice of sites is narrowed to the two examined and previously described, either of which is satisfactory.

ACTION OF THE BOARD.

At a meeting held May 9th, 1912, the State Board of Health sustained its former action of October 18th, 1911, approving the proposed site for a sewage purification plant for Canton, as shown on a plan submitted by Mr. Ray F. Harbert, director of public service, October 7th, 1911, the said site being located three miles south of the center of the city, subject to the condition that this approval become void unless a sewage purification plant of a design satisfactory to the State Board of Health be constructed prior to January 1st, 1914.

The authorities were advised that the site located in the valley of Nimishillen Creek six miles south of the center of the city was satisfactory, and the selection of that site, or the one approved October 18th, 1911, would have to be determined by a study on the part of the local officials of the relative desirability of each site.

REPORT ON PROPOSED SEWERS FOR CHICAGO JUNCTION.

On May 31st, 1912, a communication was received from Mr. John Laylin, engineer for the village of Chicago Junction, requesting approval of the State Board of Health for the extension of the present sewer outlets and the combining of same into one main outlet. A general plan of the village was submitted showing the location of the existing sewers and proposed extension. Following the receipt of the above communication, the principal assistant engineer visited Chicago Junction for the purpose of making an examination of the ground relative to the proposed construction. The following report was submitted:

The village of Chicago Junction is located in the southwestern corner of Huron County, on the watershed of the Huron River which flows in a northerly direction four and one-half miles to the east of the village. The population according to the 1910 census is 2,950, showing an increase of 612 for the past decade. Chicago Junction is essentially a railroad community, being a division point on the main line of the Baltimore & Ohio Railroad. Aside from the railroad shops the village has no important industries. In the way of municipal improvements the village is provided with a public water supply of good sanitary quality, although the water contains a pronounced hydrogen sulphide odor; about $2\frac{1}{2}$ miles of paved streets; and about 2.8 miles of combined sewers.

The topography of the village and surrounding country is slightly rolling, and the surface drainage is in a northerly direction to two very small streams which are tributary to the west branch of the Huron River. The existing sewers comprise 2.8 miles of sewers built on the combined plan and varying in size from 10 to 36 inches. These sewers have been built piecemeal and as a result do not conform to a predetermined system, which is essential for proper disposal. With the exception of a small sewer which discharges at a point north of the village into a small stream tributary to the west branch of the Huron River, all of the sewage is discharged into an abandoned reservoir originally constructed by the B. & O. Railroad and used as a source of water supply for its shops and locomotives. This reservoir, which has an area of approximately 4,000 square feet, consists of shallow earth excavation and is located just south of the B. & O. Railroad and within the built up portion of the village. The outlet of the reservoir is located at its northern end and consists of a very small stream which is carried under the railroad tracks by means of a box culvert. During the dry seasons the content of the reservoir becomes very stagnant as it consists largely of sewage discharged into it from four different outlets along its banks. No satisfactory estimate could be made of the quantity of sewage entering the reservoir at the time of the inspection as several of the outlets were almost completely submerged. At the main outlet from the reservoir the flow was roughly estimated to be 150 gallons per minute, or 216,000 gallons in twenty-four hours. As there is practically no dilution of the sewage in the reservoir, there has arisen a nuisance which is the source of general complaint.

Previous Action of the Board. On July 10th, 1905, plans for a system of sanitary sewers and sewage purification were submitted for Chicago Junction by The Riggs & Sherman Company of Toledo, consulting engineers for the village. These plans were approved by the State Board of Health July 21st, 1905, provided the sand area be increased when deemed necessary by the Board.

The engineers were advised that the valve controlling the by-pass leading from the grit chamber into the creek should be closed and sealed by the health officer of Chicago Junction, and that this by-pass should be used only in an emergency and with the knowledge of the health officer; and that while either system of operating the dosing tank would be satisfactory if properly adjusted and occasionally looked after, the size of the tank should be such that each dose would not exceed 2,000 gallons.

It was understood, from certain members of the village council, that the area of land upon which the purification works were to be located would be of a size satisfactory to the State Board of Health.

The above plans were never carried out and the village has since constructed combined sewers in such districts where the demand for

drainage facilities has been most urgent. These combined sewers have been constructed without consulting the State Board of Health.

Proposed Construction of Sewers. During the past winter the B. & O. Railroad Company has drained the reservoir into which the existing sewers discharge and has decided to refill the old excavation, making it necessary for the village to extend its present sewer outlets through the reservoir site. For this work, \$14,000 has been appropriated. It is proposed to extend the 36-inch Dale Avenue sewer using 36-inch construction, the 24-inch Clark Street sewer using 30-inch construction, and the 27-inch outlet of the Main Street sewer using 27-inch construction; all to an outlet at the south end of the box stone culvert extending through the B. & O. Railroad roadbed on the west side of the roundhouse.

Although the proposed construction does not involve the use of a new outlet, it should be noted that the character of the sewage entering the stream into which the reservoir discharges will be greatly different, as the reservoir provided a fairly long period of sedimentation. The railroad company has recently constructed a 36-inch combined sewer north of the railroad, which discharges into the reservoir outlet. Considerable waste water and some sewage is discharged into the stream from the railroad shops, where it is estimated that 150 men are employed. The dry weather flow of this stream consists almost entirely of sewage, a condition which is likely at any time to result in complaints from lower riparian owners. An examination of the stream north of the railroad indicated that deposits of heavy sludge had accumulated and were highly putrescible. This condition was not observed to extend down the stream for more than half a mile.

The stream which receives the above wastes flows in a northerly direction a distance of four and one-half miles and discharges into the west branch of the Huron River. The country through which it flows is sparsely settled and the land appears to be highly cultivated. The valley of the stream is used largely for cattle grazing. The first community below Chicago Junction is Monroeville, which is sixteen miles distant by water. Monroeville obtains its water supply from the west branch of the Huron River which it uses without purification. Examinations of the water supply of Monroeville have shown the water at all times to be dangerous for drinking and domestic purposes. It is claimed locally that the river supply is used only for fire purposes. However, the recent construction of sewers will without doubt lead to the rapid use of the raw river water for domestic purposes.

At the time of the recent examination, the valley of the stream into which the sewage of Chicago Junction is to be discharged, was inspected with a view to the feasibility of securing a suitable site for a sewage purification plant. At this time it was observed that the stream had considerable fall and that there was available land sufficiently removed

from habitation and at such elevation with respect to the proposed sewer outlet to permit of the installation of a gravity plant.

SUMMARY.

In summarizing the foregoing, special attention should be called to the following point:

1. Owing to the proposed filling in of the B. & O. Railroad reservoir, it is necessary that a new outlet be provided for the sewers at present discharging into the reservoir.

ACTION OF THE BOARD.

At a meeting of the State Board of Health held June 19th, 1912, this report was considered and the Board voted to first call attention to the fact that the construction of sewers in various portions of the village had not been carried out in accordance with plans approved by the State Board of Health in 1905, and that this construction had been done in violation of Section 1240 of the General Code.

The plan of Mr. John Laylin, engineer for the village, submitted May 31st, 1912, providing for the collection of the sewage at present discharged into the B. & O. Railroad reservoir, at one point of outlet, was approved by the Board subject to the following conditions:

"1st. That the village submit to the State Board of Health comprehensive plans for future installation of sewers and purification of the dry weather flow from all existing and future sewers; and,

2nd. That this approval be void unless the said plans shall have been submitted prior to September 1st, 1912, and purification works installed prior to September 1st, 1913."

REPORT ON PROPOSED CHANGES IN PLAN OF INTERCEPTING SEWERS AND PROPOSED LOCATIONS FOR SEWAGE PURIFICATION PLANTS FOR CLEVELAND.

At a meeting of the State Board of Health on May 9th, 1912, Mr. Robert Hoffman, city engineer of Cleveland, presented a plan outlining proposed changes in the general plan of the intercepting sewers and proposed locations for sewage purification plants at Cleveland. The matter was referred to a committee consisting of Dr. William T. Miller, and Mr. John W. Hill. Later, the President of the Board added to the committee Dr. Frank Warner, member ex officio, and Mr. W. H. Dittoe, chief engineer. On June 11th, 1912, an investigation of proposed changes and proposed locations was made by the committee, and a conference was held with the local officials. On June 14th, Mr. W. J. Springborn, director of public service, submitted a formal application for approval

of the plans, accompanied by plans of the proposed locations and a statement relative to the intercepting sewer system and proposed plan for completing the system and treating the sewage.

The following report was submitted:

Cleveland is situated in the northeastern portion of the state on Lake Erie at the mouth of the Cuyahoga River. The present population is 600,000 and the growth of the city is very flourishing. The public water supply is obtained from a crib located about four miles north of the mouth of the Cuyahoga River and is at present being purified by the treatment with calcium hypochlorite. The sewage of the city is constructed on the combined plan and the dry weather flow discharges at various points into the Cuyahoga River and at two outlets in Lake Erie.

Previous to 1895 the sewers discharged at numerous points along the shore of the lake and along the river front. The water supply was drawn from a crib one and one-third miles from the shore and one mile west of the river. These conditions demanded improvement to safeguard the health of the city, and therefore in the early part of 1895 when the city proposed the construction of additional sewers in west Cleveland, the Board disapproved of them and advised a broad and comprehensive study of the problem of improving the sewerage conditions and the water supply. Later, during the same year, the local officials presented a statement including a message of the mayor advising the employment of a sanitary commission composed of experts of national reputation to devise a proper solution of the problems. The Board voted to approve of plans for sewerage for west Cleveland which would harmonize with findings and general plans to be reported by the expert sanitary commission. Later, in 1896, the commission advised the construction of a system of intercepting sewers providing for the discharge of the dry weather flow from the entire city into the lake at one point of outlet located in the extreme easterly portion of the city. The commission also advised the construction of a new water works intake some four miles north of the mouth of the Cuyahoga River. In April, 1896, the general plans for sewerage improvements were approved by the Board.

Since 1896 portions of the intercepting sewer system have been constructed and the outlet established at a point seven and one-half miles east of the mouth of the Cuyahoga River in the extreme easterly portion of the city. This outlet was established about four years ago and discharges the sewage of approximately half of the city's population. An outlet for the westerly portion of the interceptor is located one mile west of the mouth of the Cuyahoga River and discharges the sewage from approximately six per cent. of the population. That portion of the interceptor extending up the valley of the Cuyahoga River has not been constructed nor has the large inverted siphon connecting the westerly with the easterly portion been installed. There are, however, 21 sewer

outlets discharging into the Cuyahoga River, which serve approximately 44 per cent. of the city's population. In addition to these dry weather outlets, there are 17 storm water overflows from the intercepting sewer discharging into Lake Erie.

The system of intercepting sewers was designed to receive the sewage from a population of one million, and to carry during times of storms an equal quantity of storm water, thus furnishing a dilution in the sewers of 1 to 1. As the easterly portion of the interceptor serves only half of the city's population, the dilution during storms is in excess of that designed and the storm water overflows operate less frequently than intended. The original design did not contemplate the necessity of treatment of the sewage and assumed that dilution in the lake would provide for its proper disposal. The conditions at the main outlets into the lake are at times the cause of complaint. Although the sewage at the easterly outlet is discharged about half a mile from the shore through a submerged outlet, the beach is frequently polluted and it has become necessary to forbid its use for bathing purposes. At the westerly outlet marked evidences of pollution are also apparent and objectionable odors prevalent. The outlets into the Cuyahoga River create very objectionable conditions in the stream and for a great number of years the river has been notoriously polluted. By dredging, the channel is maintained navigable to the southerly portion of the city. The flow is very sluggish and the velocity seldom reaches one foot per second. Even in times of high stage the flow does not exceed 3 feet per second. During dry weather the river becomes especially foul and the liquid is almost entirely sewage. The seriousness of the condition of the river is emphasized by the danger of pollution of the city's water supply.

PROPOSED CHANGES IN PLANS.

The plans for changes in the intercepting sewer system proposed by the city comprise the maintenance of the outlets into Lake Erie from the easterly and westerly portions of the intercepting sewers, and the construction of an intercepting sewer along the valley of the Cuyahoga River. Instead of grading this interceptor toward the lake, it is planned to carry the dry weather flow in a southerly direction to a point six miles in a direct line and twelve miles by water above the mouth of the river. The proposed plans also include the establishment of treatment works at each of the three sewer outlets. Since the formulation of the plan in 1896, which contemplated the discharge of the sewage without treatment, there has taken place a reversal in opinion as regards the proper disposal of the sewage and the relation of the sewage discharge to the quality of the water supply. This has resulted in the general opinion that some form of sewage treatment is necessary in order to prevent local nuisance and also pollution of the water supply. Considering the necessity of sewage treatment, it became necessary to calculate the possibilities of securing

it by following out the original plan. Study demonstrated that it was inadvisable to carry the entire sewage flow to the easterly lake outlet if treatment was to be adopted, as the location of this outlet offered limited opportunity for the establishment of suitable works. It is also apparent that inasmuch as disposal of sewage into the lake must include the employment of the dilution afforded, it is not advisable to discharge the entire volume of sewage flow at one point. It would appear that the plan of separating the sewerage into three systems and establishing purification for each is an improvement over the plan of discharging the entire flow at one point.

Locations for Sewage Purification Plants. The plans submitted provide for the establishment of sewage purification plants at three locations. The easterly location is at the existing sewer outlet, the westerly location is near the present outlet of the westerly interceptor, and the southerly location is in the valley of the Cuyahoga River six miles from the lake, to which point the proposed new interceptor will be carried. The city has optioned these sites and proposes immediate purchase.

The easterly location, at the present main outlet, has an area of approximately 30 acres and is located within the city limits immediately east of Bratenahl village, through which the intercepting sewer passes. At the present time the city owns seven acres at this site. The location is not a desirable one for the establishment of sewage purification works as it is immediately surrounded by dwellings of good construction. Within a radius of one-fourth mile there are approximately 35 dwellings, and the growth in this vicinity is active. The presence of the outlet has not greatly hindered the development of the vicinity although marked odors are produced. However, it is proposed to construct a plant comprising screens, sedimentation or septic tank, and disinfection, the effluent to be discharged through a submerged multiple outlet into the lake at about half a mile from the shore and the sludge to be disposed of by mechanical drying. The tanks will probably be covered with earth and the plant as a whole will present the appearance of a pumping station, and if properly managed should cause no more complaint. To protect the bathing beaches, it is proposed to disinfect the tank effluent during the summer season.

Near the westerly outlet two alternate sites are proposed, designated as Sites A and B. The first comprises an area of seven acres located between Crescent Avenue and Division Avenue, immediately west of West Forty-fifth Street. This site is fairly well removed from buildings and is protected from view from the south by a steep embankment. Immediately north of the site are the shops of the American Ship Building Company, and there are no dwellings within 500 feet. Site B comprises four acres adjoining Edgewater Park and is immediately east of the government breakwater. Should this site be utilized it would be

necessary to fill in the lake to the established harbor line and thus make ground for the plant. Site B is about 1,500 feet northwest of Site A and has the same relative advantages of location. The plant to be established on either site would have the same general features as that to be built at the easterly outlet, and the effluent would be carried through a submerged multiple outlet.

The southerly site upon which a plant will be located to receive the sewage at present discharged into the Cuyahoga River, is situated in the extreme southerly portion of the city in the valley of the Cuyahoga River. The site presents unusual advantages for the location of treatment works as it lies in a natural depression surrounded on three sides by steep slopes and adjacent to the river on the other side. The city proposes to purchase 300 acres at this location, which area will be ample for the establishment of purification works of almost any type. The sewage will be conveyed to the site by gravity, and the head available will be sufficient to operate any type of plant except sprinkling filters. It is proposed to establish a plant capable of producing a nonputrescible effluent. The detailed plans of each of the sewage disposal plants will of course be worked out subsequently to the results obtained from experiments in sewage treatment to be carried on during the coming year.

ACTION OF THE BOARD.

At a special meeting of the State Board of Health held June 28th, 1912, the Board considered the petition of the city of Cleveland with respect to the location of a sewage purification plant south of the city and to the east of the Cuyahoga River and voted to approve this location for a sewage purification plant with the understanding that the method of sewage disposal to be adopted and installed at this location should represent the most advanced state of the art of sewage purification and should be in all respects satisfactory to the State Board of Health before plans would be approved.

The authorities were notified that the question of locations for sewage disposal works at the easterly and westerly points, as proposed by them would be held in abeyance for further consideration by the Board.

In compliance with a request November 19th, 1912, from the Director of Public Service of Cleveland, the State Board of Health at a meeting held November 21st, 1912, reaffirmed its action of June 28th, 1912, approving the site for sewerage purification plant, as shown on plans received from the city engineer on May 9th, June 13th and June 14th, 1912.

REPORT ON PROPOSED SEWERAGE AND SEWAGE PURIFICATION FOR BROOKLYN SUBDIVISION NO. 2, THE CITIZENS LAND AND IMPROVEMENT COMPANY, CLEVELAND.

On July 25th, 1912, plans which were prepared by The Evers Engineering Company of Cleveland, were received from Mr. George B. Clement, president and treasurer of The Citizens Land and Improvement Company of Cleveland, for proposed sewerage and sewage purification for a small real estate addition known as Brooklyn subdivision No. 2, which was recently laid out by that company. Additional information and plans which were requested were received July 31st, 1912, and on August 2nd, 1912, one of the assistant engineers visited Cleveland and investigated the proposed improvement. At that time it was pointed out to Mr. Clement that the proposed plant, as designed, would be entirely inadequate for the purpose and it was advised that new plans be submitted. Accordingly, on August 10th, 1912, a communication was received from Mr. Clement withdrawing the original plans and stating that new plans were being prepared. These plans were submitted by Mr. R. Winthrop Pratt, consulting engineer, on August 10th, 1912, and were referred to the engineering department. The following report was submitted:

Brooklyn subdivision No. 2 of The Citizens Land and Improvement Company is located in the extreme southerly part of the city of Cleveland, just south of Broadview Road between Spring Road and Valley Road. The surrounding district was but recently annexed by the city. The subdivision, which consists of about eight acres of land, contains about 75 lots, laid out on both sides of Treadway Avenue. There are at present eight houses constructed in the addition and it is expected that there will be only one or two more houses constructed during 1912. The lots, most of which are sold, were purchased on the installment plan and there will hence probably be few houses constructed during the next two or three years.

The sewers of the city at present extend to the corner of Broadview and Valley Roads, about 700 feet from Treadway Avenue. The elevation of the addition, however, is such that it will be impossible to connect with this sewer. Plans for sewers in Spring, Valley, and Jennings Roads, with an outlet into the Cuyahoga River, have been approved by council, but it was stated by Mr. Hoffmann, city engineer, that these sewers may not be constructed until 1916 or 1917. The proposed plant, therefore, will be of temporary construction and is designed to operate for this period only.

PROPOSED SEWERAGE.

The proposed sewerage for the addition consists of a single line of sewers, 900 feet in length, made up of 600 feet of 12-inch and 300 feet

of 15-inch vitrified pipe, with an outlet on lot No. 40 in the western end of the addition. The outlet is into a small stream which has its origin about one-fourth mile south of the addition. This stream flows north and empties into Big Creek, a tributary of the Cuyahoga River, about one mile distant. The sewer will carry both storm and sanitary sewage, and the dry weather flow will be diverted to the plant by means of a diverting manhole.

PROPOSED SEWAGE PURIFICATION PLANT.

Location. The sewage purification plant will be located along the small stream in the western end of the division. The only building within 300 feet of the site is an old frame dwelling about 100 feet to the west. There are no buildings along the stream below the plant for a distance of about one mile. The plant, therefore, if properly operated, will cause no nuisance, and the location should be considered favorable from a sanitary point of view.

General Features of Plant. The plans for the plant in general include a diverting manhole, a "two-story" settling tank, a dosing tank, and two sand filters. As it will be expected to operate for only three or four years, it will be constructed largely of wood. It is designed for a maximum tributary population of 100 persons with a daily sewage flow of 30 gallons per capita, and will provide for three times the normal dry weather flow.

Diverting Manhole. The normal dry weather sewage flow will be conveyed to the plant from a diverting manhole by a 6-inch cast iron pipe line. The manhole is provided with an adjustable weir over which the storm flow will pass directly to the stream. The adjustment of the weir will determine the maximum flow reaching the plant. Though not shown on the plans, it was stated by the consulting engineer that a gate valve will be provided in the cast iron line to the plant, which may be set to prevent an excessive flow through the plant. By this means a minimum period of flow of two hours will be provided through the settling tank.

Settling Tank. The settling tank will be 6 feet in diameter by 12 feet deep, outside dimensions. The bottom of this tank, which will be constructed of concrete, will be pyramidal in shape, the bottom sloping to the center from a point two feet from the bottom. The settling compartment, in the top of the tank, will be constructed in the shape of a trough and will be open at the bottom to allow the heavier solid matters to settle into the sludge compartment below. The settling compartment will have a capacity of about 560 gallons, which, on a basis of 3,000 gallons daily flow, will provide for $4\frac{1}{2}$ hours retention of the sewage. The sludge compartment has a capacity of 880 gallons, or 117 cubic feet, below the slot of the settling compartment, which on a basis of 0.0035 cubic feet of sludge per capita per day, will provide for about ten months storage, which is entirely sufficient for the purpose. A 6-inch cast iron

sludge removal pipe will extend from the bottom of the sludge compartment. The sludge will be discharged into an open trench which it is intended to fill in as soon as the sludge is dry. This method of disposal of the sludge should be satisfactory if provision is made for quick drainage of the liquid.

Dosing Tank. The sewage will flow from the settling tank into a wooden dosing tank 8 feet by 10 feet in plan by 2 feet deep. A 3-inch Miller siphon will be installed in this tank, which if set to draw $1\frac{1}{4}$ feet will provide a dose of about 750 gallons, which will flood one of the filters to a depth of about 0.2 foot. Under these conditions the siphon will operate normally once every six hours.

Filter Beds. There will be two filter beds, each 31 feet by 16 feet in size with a total area of about 0.023 acre. Based on a sewage flow of 3,000 gallons per day, the filters will operate at a maximum rate of about 133,000 gallons per acre per day or will provide for about 4,400 persons per acre. The filter beds will be constructed with wooden walls and bottoms. The filtering material will be about $2\frac{1}{2}$ feet thick and will consist of either coke or cinders, covered with a thin layer of sand. The sewage will enter a small gate chamber adjoining the filters, from which it will be diverted to either one of the two filters by means of wooden slide gates. This arrangement will require considerable attention by a caretaker. The flow on to the different filters should be changed at least twice a week. The sewage will be distributed by means of wooden troughs 6 inches wide by 3 inches deep, inside dimensions, which will extend through the middle of each bed, with open gates placed 6 feet apart for distribution purposes. The collection system in each bed consists of 4-inch vitrified pipe with open joints laid from each corner to the center of the bed. These pipes will be protected at the center by means of a broken stone cover.

SUMMARY.

In conclusion it may be stated that:

- (1) The proposed location of the plant is satisfactory.
- (2) The plant will be constructed largely of wood which, on account of temporary use to which the plant will be put, should be considered satisfactory.
- (3) A proper sewage flow to the plant will be provided by means of a diverting manhole, containing an adjustable weir, and also a gate valve in the sewer line to the settling tank. This apparatus will require careful attention.
- (4) The sludge will be discharged into an open trench provided for the purpose. Considerable care will be necessary with this method in order to prevent a nuisance being created.
- (5) The sewage will be diverted to the different filter beds by means of hand operated slide gates. These gates should be changed

at least twice a week in order to provide proper periods of rest for the filters.

(6) On account of the temporary character of the plant, both as regards its construction and operation, it should be required that considerable and frequent attention be given to the plant in order that it may operate satisfactorily and prevent a nuisance being created.

ACTION OF THE BOARD.

At a meeting held August 15th, 1912, the State Board of Health approved the plans for proposed sewerage and sewage purification for Brooklyn subdivision No. 2 of The Citizens Land and Improvement Company of Cleveland, submitted by Mr. R. Winthrop Pratt, consulting engineer, on August 10th, 1912, subject to the following conditions:

1st. That samples of the filter materials be submitted to and approved by the engineer of the State Board of Health before being placed; (Samples approved September 14, 1912)

2nd. That The Citizens Land and Improvement Company employ a caretaker to visit the plant at least twice each week and attend to its proper operation;

3rd. That underdrains be provided in the proposed sludge trench to bring about the rapid drainage of the sludge without nuisance;

4th. That the entire plant be abandoned and removed as soon as sanitary sewers for the district shall have been constructed by the city of Cleveland; and,

5th. That this approval be considered void unless the proposed sewer and sewage purification plant shall have been constructed prior to January 1st, 1913.

REPORT ON PROPOSED COUNTY STORM WATER SEWER AT FOREST.

On October 9th, 1912, plans and specifications for a proposed county storm water sewer at Forest were submitted by Mr. L. R. Anspach, county surveyor of Hardin County. On October 17th, 1912, one of the assistant engineers visited Forest and investigated the proposed improvement. The following report was submitted:

Forest is a village with a population of 1,300 located in the central portion of Hardin County on the drainage area of the Blanchard River. The topography of the village and surrounding country is flat and drainage is effected slowly by ditches. The village has no municipal improvements with the exception of a few short storm water drains.

In order to provide adequate drainage the citizens of the village have petitioned the county commissioners to construct a storm water sewer. While this sewer is intended primarily for surface drainage, it is also evidently the intention to utilize it for the removal of domestic sewage.

The plans of the proposed sewer provide for a main sewer extending in a northerly direction through the easterly portion of the village.

A lateral sewer will also connect with the main sewer and will supply drainage for the extreme easterly portion of the village. The main sewer will be constructed of vitrified pipe ranging from 8 to 36 inches in diameter and the lateral sewer will be constructed of drain tile and vitrified pipe carrying from 6 to 15 inches in diameter. The discharge of the main sewer will be into an open ditch, a short distance northeast of the village. This ditch will follow a course $3\frac{1}{2}$ miles to the north and discharge into Wharton Ditch, which is a tributary of the Blanchard River.

In the construction of the sewer it is specified that Y branches shall be placed at all street and alley intersections to facilitate future connection to the sewer for storm water removal. In the construction of future laterals care must be taken to prevent the misuse of the sewers and to this end no house connections should be permitted or made possible. Catch basins will be located conveniently for the removal of surface water from the streets of the village.

ACTION OF THE BOARD.

At a meeting held November 21st, 1912, the State Board of Health approved the plans and specifications for a proposed county storm water sewer at Forest, submitted by Mr. L. R. Anspach, county surveyor of Hardin County, October 9th, 1912, subject to the following conditions:

1st. That the proposed sewer and future laterals to the same shall be used for the removal of surface water only, and that in the construction of the sewer and future laterals no Y branches for house connections shall be placed;

2nd. That the council of the village of Forest pass an ordinance restricting the use of the sewer by prohibiting connections for closet wastes, sink drainage, household wastes of all kinds, and cesspool overflow; said ordinance to be approved by the Secretary of the State Board of Health before its passage;

3rd. That no additional laterals to the proposed sewer shall be constructed until plans and specifications for the same shall have been submitted to and approved by the State Board of Health; and,

4th. That this approval shall be void after June 1st, 1913, unless construction of the proposed sewer shall have been commenced prior to that date.

REPORT ON PROPOSED SEWERAGE AND SEWAGE PURIFICATION FOR GRANVILLE.

On August 10th, 1912, The W. J. Sherman Company of Toledo, consulting engineers for Granville, submitted plans for a proposed system of sanitary sewers and a sewage purification plant for the village. On August 1st, 1912, one of the assistant engineers visited Granville and made an examination of the proposed site. The plans were examined in the engineering department and the following report was submitted:

Granville is located in the central portion of Licking County on

Raccoon Creek, a tributary of the Licking River, which it joins within the city of Newark nine miles below Granville. The population of the village is about 1,400. This population is increased by several hundred during nine months of the year by the enrollment at Denison University which is located within the village.

The topography of the village and surrounding country is rather hilly. Drainage from the principal portion is in a southerly direction to Raccoon Creek, but the extreme easterly portion drains to a small tributary of the creek.

Aside from a public water supply, the village has no municipal improvements. In the absence of sewerage facilities, crudely constructed privy vaults are in general use. These are usually built so as to permit of seepage through the bottom into the open gravel formations. By this means the subsoil water of the village is badly polluted.

In 1894 the village first took steps to secure a system of sewers. At that time consulting engineers were employed to report on the cost of such a project, but following the preparation of the report nothing was done by the village. A recent examination of the water supply by the State Board of Health, made in January, 1912, demonstrated the fact that the public supply wells are endangered by the seriously polluted subsoil drainage from the village. The village officials were informed of this fact, which doubtless encouraged the immediate construction of sanitary sewers.

The plans of the consulting engineers recently prepared include the design of a complete system of sanitary sewers and a sewage purification plant.

PROPOSED SEWERAGE.

The sewerage system will comprise 6-inch, 8-inch, 10-inch and 12-inch vitrified pipe laid with cemented joints and proper grades to secure self-cleansing velocities. Manholes are provided at all changes of grade and direction, and flush tanks will be placed at dead ends to cleanse the sewers. The total length of the sewerage system is 5.8 miles, divided as follows:

6-inch pipe	880 feet
8-inch pipe	26,010 feet
10-inch pipe	540 feet
12-inch pipe	3,090 feet
Total	30,520 feet

The sewers are located so that all portions of the village will be provided with sewerage conveniences.

Denison University, an institution which has an attendance of several hundred, is at present provided with sewerage and a crude sewage purification plant. The purification plant consists of an area of natural

filters located a short distance west of the village in the valley of Raccoon Creek. The underdrains from this area discharge into the creek. This installation was made in 1897 following approval by the State Board of Health. The existence of this disposal area is objectionable as it is located only about 1,800 feet above the existing water supply wells of the village. An effort will be made by the village authorities to obtain co-operation between the university and the village in the construction of a sewage purification plant in order that the university sewerage system may be connected to the village sewers.

PROPOSED SEWAGE PURIFICATION PLANT.

The design of the consulting engineers provides for the installation of a purification plant to comprise sedimentation and secondary purification by intermittent sand filters.

Site. The sewerage system is so designed that the entire flow will be conveyed to one point of outlet in the extreme southeasterly portion of the village. Raccoon Creek flows in an easterly direction along the southerly corporation line and the T. & O. C. Railway parallels the creek about 600 feet north of the stream. The intervening land is low and flat and secluded from the territory to the north by the railroad embankment. It becomes flooded during high stages of the stream, but suitable diking will protect the purification plant against damage. The site selected lies in this tract immediately south of the T. & O. C. Railway and east of Granger Street extended. The site to be purchased has a total area of 4.54 acres, which may be added to as occasion demands. The site is well removed from habitations, the nearest dwellings within the village being about 1,000 feet distant. The nature of the surrounding territory is such that future building development will be unimportant. Immediately north of the site and across the railroad is a large cemetery. The proximity of the sewage purification works would be objectionable were it not for the railroad embankment which intervenes. In developing the site it is proposed to construct the plant near the railroad and the creek and make future extensions parallel to the railroad and the creek. In this way the difficulty of diking will be reduced.

By-pass Manhole. The 12-inch main sewer immediately before it reaches the plant passes through a by-pass manhole by which the sewage flow may be diverted to the sludge bed. This by-pass is installed for emergency in case of difficulties encountered in the continuous operation of the plant.

Sedimentation Tanks. The 12-inch main sewer enters a weir and screen chamber 5 feet by 4 feet in plan, from which the sewage flows in either of two directions through screens and over weirs into grit chambers which extend across the ends of the sedimentation tanks. The grit chambers are 4 feet by 7 feet 6 inches and 4 feet by 12 feet 6 inches in plan, respectively, and serve to distribute the flow entering the sedi-

mentation tanks. Four-inch openings from the grit chambers provide for the introduction of the sewage into the sedimentation tanks at mid-depth. The grit chambers may be drained to the sludge filter.

The sedimentation tanks are of reinforced concrete construction, 65 feet in length and 10 feet and 15 feet in width, respectively. The average depth to the flow line is 5.8 feet. The capacities of the tanks are 28,000 and 42,000 gallons, respectively, providing periods of flow of 6.7 hours and 10 hours, respectively, when the sewage flow is 100,000 gallons per day. The tanks provide an 8-hour period of flow for a sewage flow of 210,000 gallons. Five hanging baffles are provided and distribute the flow to prevent stratification, while one submerged baffle is placed to retard the sludge movement. The sewage passes over broad weirs at the outlet ends and enters a 12-inch by 12-inch covered concrete channel conveying it to the dosing chamber. The sludge is removed by 12-inch drains located one-third the length from the inlet end, to which point the floors are sloped.

Sludge Filter. The sludge filter is 130 feet by 45 feet in plan with an area of 5,850 square feet, sufficient to receive the contents of the larger sedimentation tank with flooding slightly less than one foot. The filtering material in the sludge filter will consist of 2 feet of sand supported upon $\frac{1}{8}$ -inch to $\frac{1}{2}$ -inch of washed gravel. Immediately surrounding the underdrains will be placed $1\frac{1}{2}$ inches of washed gravel. The underdrains are suitably placed in valleys extending across the bottom of the filter.

Dosing Chamber. The dosing chamber, which is to store the flow from the sedimentation tanks and intermittently apply it to the filters, is of reinforced concrete construction and is covered in part by a concrete roof and in part by a brick building of substantial construction. The chamber is 32 feet by 16 feet in plan and 4 feet in depth, giving it a capacity of 15,200 gallons, which is sufficient to flood one of the filter units to a depth of 2.2 inches. Four 10-inch sequence siphons are to be installed to dose the filters.

Intermittent Filters. The design of the consulting engineers provides for the ultimate installation of three acres of filters. For the present time it is proposed to install one acre constructed in four units. The filters are each 175 feet by 63 feet in plan. Sewage from the dosing chamber will be satisfactorily distributed by concrete troughs provided with numerous lateral openings extending to all portions of the filters. The filtering material will consist of 30 inches of sand resting upon an underdrainage system. The bottoms of the filters are constructed in ridges and valleys. The lines of underdrains are placed in the valleys and surrounded by graded washed gravel which supports the sand. The main effluent drain to the filters connects with the effluent drain from the sludge filter into a line which discharges through a flap valve into Racoon Creek.

SUMMARY.

From the foregoing report it will be noted that the design of the consulting engineers for proposed sewerage and sewage purification for Granville is satisfactory and if properly carried out will provide an improvement which will do much to improve the sanitary conditions of the village. It is important that the sewerage from Denison University be connected with the city sewers and every effort should be made to bring about a co-operation which will make this possible.

ACTION OF THE BOARD.

At a meeting held August 15th, 1912, the State Board of Health approved the plans for a proposed system of sanitary sewers and a sewage purification plant for Granville, submitted by The W. J. Sherman Company of Toledo, consulting engineers for the village, on August 10th, 1912, subject to the following conditions:

1st. That the proposed sewage purification plant be constructed in accordance with the plans, before connections to the sewers are made.

2nd. That before connections to the sewers are permitted, the village council pass an ordinance, satisfactory to the Secretary of the State Board of Health, which will regulate the use of the sewers.

3rd. That samples of all filtering material be submitted to and approved by the Engineer of the State Board of Health before being placed.

4th. That detailed plans of the automatic dosing apparatus be submitted to the State Board of Health before being installed.

5th. That the village appoint a competent operator, satisfactory to the State Board of Health, to have general supervision of the sewerage system and purification plant.

6th. That this approval be considered void unless the proposed sewers and sewage purification plant shall have been constructed prior to January 1st, 1914.

The officials of the village and of Denison University were urged to co-operate with the view of connecting the sewerage system of the university with the village sewers and thus provide for the abandonment of the disposal field of the university, which is objectionable.

REPORT ON PROPOSED SEWERAGE AND SEWAGE PURIFICATION FOR THE HOME FOR THE AGED AND INFIRM DEAF NEAR WESTERVILLE.

On November 26th, 1912, plans and specifications for proposed sewerage and sewage purification for the Home for the Aged and Infirm Deaf, near Westerville, were received from Mr. W. E. Chapman, superintendent of the institution. On November 21st, 1912, one of the assist-

ant engineers visited the institution and made an examination relative to the proposed improvement. The following report was submitted:

The Home for the Aged and Infirm Deaf is a quasi-public institution under private management located in Franklin County about two and one-half miles southeast of Westerville. It is on the drainage area of Big Walnut Creek which stream is about 2,000 feet from the institution. The population at the present time is about 40, including 31 inmates. The property of the institution comprises 115 acres upon which have been constructed a main building, two cottages, and several out buildings. A recently installed addition to the main building will be used entirely by the female inmates, and in this addition modern plumbing facilities will be installed. For the purpose of properly disposing of the liquid wastes it is necessary to install sewerage and sewage purification.

The topography of the vicinity is rolling and the drainage is in a general south-easterly direction to Big Walnut Creek. Immediately west of the institution the drainage is in a westerly direction to a branch of Alum Creek.

Proposed Sewerage. The proposed sewerage will comprise a single line of 6-inch vitrified pipe about 1,000 feet in length extending in a westerly direction from the main building. This line will be placed at a 0.5 per cent. grade and will be provided with manholes at intervals of 300 feet. The sewer will be laid with cemented joints to prevent the infiltration of the ground water.

Proposed Sewage Purification Plant. The plans for the purification plant provide for a screen chamber, septic tank, and secondary treatment by subsoil irrigation. The plant is designed for a population of 50 and a sewage flow of 1,500 gallons per day. The screen chamber and tank will be placed at the termination of the sewer, about 1,000 feet west of the institution, and in this location are not likely to cause complaint. The screen chamber will be a rectangular concrete structure containing a single screen and will be covered with a wooden door. The septic tank will be a rectangular concrete structure 10 by 4 feet in plan and 5 feet deep to the flow line. It will be covered with a removable wooden roof. The capacity of the tank is 1,500 gallons which will provide approximately 24 hours' retention. Baffles for the distribution of the flow are placed at the inlet and outlet ends, and the bottom of the tank is sloped toward the inlet end to facilitate sludge removal. The sludge will be removed by carting in barrels and disposed of by burial.

A dosing tank 7 by 6 feet in plan and about 12 inches deep to the flow line will be provided to store and dose the settled tank effluent. The capacity of the dosing tank is 400 gallons, and discharges will, therefore, take place about four times each 24 hours.

The discharge from the dosing tank enters a 6-inch line about 100 feet long, at the end of which will be placed a diverting gate chamber

from which the flow may be discharged into either half of the subsoil irrigation system. The laterals consist of four lines of 4-inch drain tile, each 150 feet in length, placed parallel and 25 feet apart. The total capacity of the subsoil system is about 550 gallons, which is amply sufficient to receive the dose of 400 gallons. The drain tile will be laid on an almost flat grade and the joints will be placed somewhat open. The soil is of a fairly porous nature, but contains considerable clay so that it will be desirable to remove it and place gravel surrounding the drain tiles. The plans provide for the excavation of a trench about 3 feet deep and 16 inches wide. In the bottom of the trench will be placed a line of 4-inch drain tile and the distributing lines will be placed about $1\frac{1}{2}$ feet below the surface, or about $1\frac{1}{2}$ feet above the lower tile. Loamy soil will be placed over the drain lines and gravel will surround the distributing lines. Opportunity is afforded in the planning of the system for future extension should such become necessary.

ACTION OF THE BOARD.

At a meeting held December 12th, 1912, the State Board of Health approved the plans and specifications for proposed sewerage and sewage purification for the Home for the Aged and Infirm Deaf, near Westerville, submitted by Mr. W. E. Chapman, superintendent of the institution, on November 26th, 1912, subject to the following conditions:

1st. That the sludge be removed from the septic tank at intervals not greater than one year and that it be disposed of by burial;

2nd. That the plant be enlarged and otherwise modified when required by the State Board of Health; and

3rd. That this approval be void unless the plant shall have been installed prior to June 1st, 1913.

REPORT ON PROPOSED CONNECTION OF SANITARY SEWERAGE OF KENNEDY HEIGHTS WITH SEWAGE PURIFICATION PLANT UNDER CONSTRUCTION AT PLEASANT RIDGE.

On August 9th, 1912, a request was received from The W. J. Sherman Company, consulting engineers for Pleasant Ridge, and Mr. J. A. Stewart, village engineer of Kennedy Heights, for approval of a proposed connection of the sanitary sewerage system of Kennedy Heights with the sewage purification plant of Pleasant Ridge now under construction. The following report was submitted:

Pleasant Ridge and Kennedy Heights are villages with populations of 1,770 and 600, respectively, in 1910, located in Hamilton County immediately north-east of the city of Cincinnati on a small tributary of Duck Creek, which forms the corporation line separating the two villages.

In June, 1911, the State Board of Health approved plans for a sewage purification plant for Kennedy Heights, submitted by Mr. J. A. Stewart, consulting engineer for the village. In August, 1911, the Board approved plans for sewerage and a sewage purification plant for Pleasant Ridge, submitted by The Riggs and Sherman Company, consulting engineers for the village. Sanitary sewers for Kennedy Heights have been constructed, but no work has been done on the construction of the sewage purification plant. The sewerage system for Pleasant Ridge has been built and the purification plant has been practically completed. The plans for the sewage purification plant for Kennedy Heights provided for a plant of 60,000 gallons capacity, comprising tanks and contact filters. The Pleasant Ridge plant as designed was of 180,000 gallons' capacity, comprising tanks and intermittent sand filters. Owing to the undesirability of operating two small sewage purification plants, the officials of the two communities have agreed to co-operate in the operation of a single plant to receive the sewage from both villages. Owing to the favorable location of the Pleasant Ridge plant and also to the fact that it has been almost completed, it has been decided to use this plant for both villages.

The connection of the two systems of sewers will make a possible population tributary to the plant of 2,370, based on the population in 1910. The water consumption within the villages is approximately 55 gallons per capita, which would indicate that the sewage flow will be 130,000 gallons per day. To properly treat this sewage will require at least $1\frac{1}{2}$ acres of intermittent sand filters, which is the area provided in the design of The Riggs and Sherman Company for Pleasant Ridge. In the construction of the Pleasant Ridge plant, one of the units included in the original design has been omitted, so that the area provided is $1\frac{1}{8}$ acres. While this area may be sufficient for the sewage from Pleasant Ridge, the increased volume added by the village of Kennedy Heights will no doubt contribute to the overburdening of the plant. It should be taken into account that the effluent from the Pleasant Ridge plant reaches Duck Creek, which passes through a populated territory before its discharge into the Little Miami River. The satisfactory operation of the sewage purification plant is therefore required to avoid nuisance. Furthermore, the plant itself is located near frequently-traveled highways, and if the plant is overworked, the foul odors which will be produced will constitute a serious nuisance.

ACTION OF THE BOARD.

At a meeting held August 15th, 1912, the State Board of Health voted to grant the village of Kennedy Heights permission to connect its system of sanitary sewers to the sewage purification plant at Pleasant Ridge, as requested in a communication received from The W. J. Sherman Company, consulting engineers for Pleasant Ridge, and Mr. J. A.

Stewart, village engineer of Kennedy Heights, on August 9th, 1912, subject to the condition that the sewage purification plant at Pleasant Ridge be enlarged in a manner satisfactory to the State Board of Health when deemed necessary by said Board.

REPORT ON PROPOSED SEWERAGE AND SEWAGE PURIFICATION FOR THE KIRTLAND FARM, NEAR POLAND.

On March 19th, 1912, a plan was received from Mr. George E. Rose, president of The Realty Security Company of Youngstown, showing a proposed suburban development near Poland and a proposed location for sewage purification works for the subdivision. In anticipation of the receipt of the plan, the chief engineer visited Poland on March 7th, 1912, and made an inspection on the ground. The following report was submitted:

The Kirtland farm, which The Realty Security Company of Youngstown proposes to develop into acre lots for suburban homes, is situated in Mahoning County immediately south of the village of Poland on the east side of Yellow Creek. The subdivision has an area of 150 acres and assuming that each acre will ultimately become occupied by a dwelling, the ultimate population will be 750. At the present time there are no buildings on the tract and for a number of years to come the population will probably not exceed 200.

In order to provide sewerage and drainage facilities, it is proposed to install sanitary sewers extending over the entire property. In the improvement it is also proposed to construct a sewage purification plant consisting of a tank and intermittent sand filters. The effluent from the plant will reach Yellow Creek. A suitable location may be found for the sewage purification works and the type of the design is such that with proper operation no nuisance could be produced in the stream by the effluent. No detailed plans for sewage purification works have been prepared but it is intended to provide deep sedimentation tanks, 8,000 square feet of intermittent sand filters, and means for disinfecting the effluent.

About one and three-fourths miles below the proposed sewage purification plant is a dam, and the reservoir thus impounded is employed as the source of public water supply for Struthers and a portion of East Youngstown. The water is used in its raw state, and this fact must be taken into consideration with respect to proposed sewerage for the Kirtland farm.

The public water supply of Struthers is owned by The Mahoning Valley Water Company of Youngstown and is used largely for industrial purposes. It is however employed to a considerable extent for domestic use within the villages of Struthers and East Youngstown and at the

present time is not purified by any artificial methods. It receives some purification by storage in a reservoir of 650,000,000 gallons capacity, which is located a short distance below Poland. At the present time the village of Poland has no system of sewers and upon the watershed of Yellow Creek there is no other community which is sewered. Nevertheless, examinations of the State Board of Health have shown that the public water supply of Struthers even under these conditions is unfit for domestic consumption and its purification is required. It is obvious that no sewage, either raw or treated, should be permitted to be discharged into Yellow Creek in such close proximity to the water supply of Struthers. Even if an efficient sewage purification plant were constructed there would constantly be the danger of neglect or improper operation. Also with a water purification plant for the domestic supply of Struthers and East Youngstown it is still of the utmost necessity that sewage be excluded from the stream by which the contamination of the supply would result.

ACTION OF THE BOARD.

At a meeting held May 9th, 1912, the State Board of Health considered the proposed sewerage and sewage purification for the Kirtland Farm, near Poland, contemplating the discharge of the effluent into Yellow Creek above Poland, as shown on a plan received March 19th, 1912, from Mr. George E. Rose, president of The Realty Security Company.

On May 6th, 1912, Mr. R. Winthrop Pratt, consulting engineer for The Realty Security Company of Youngstown, submitted a plan and profile showing proposed locations for sewage purification works for the Kirtland Farm. Based on knowledge of local conditions obtained during visits by the chief engineer and one of the assistant engineers, the following report was submitted:

No plans for the sewerage system purification works have been prepared by the consulting engineer, and thus far only sketches showing tentative locations for sewage purification works have been made. The fact that the public water supply of Struthers is drawn from Yellow Creek after storage in an impounding reservoir north of Poland, makes it objectionable to discharge the sewage effluent into the stream. It is intended to collect the sewage from the subdivision in a pump well located in the extreme northerly portion of the tract. From this point it is proposed to pump the sewage by an electrically-operated centrifugal pump through a force main of 6-inch or 8-inch pipe to a suitable location for sewage purification works. The force main will lead to one of three alternate locations for sewage purification works which are proposed by the consulting engineer. The locations are designated as Sites A, B, and C, respectively, and will be described in this order.

Site A. This site is located about 7,000 feet north-east of Poland, 1,000 feet east of Yellow Creek and above the dam impounding the

reservoir used as the public water supply of Struthers. The natural drainage from this site is into the reservoir. Although the design of a plant constructed on this site would provide for conveying the treated sewage and any possible overflow into the stream below the dam, there would constantly be the danger of pollution of the Struthers water supply from this source. There is also a sentimental objection to this location being in such close proximity to a public water supply.

Site B. This site is located immediately below the dam in Yellow Creek, a short distance east of the stream. The site is 9,000 feet north-east of Poland and is suitably located as regards the proximity of dwellings, being 2,000 feet from the nearest house. It is situated in wooded land, the natural drainage of which reaches Yellow Creek. This stream has a watershed area of 32.7 square miles above the dam and flows in a northerly direction about one and one-half miles, entering the Mahoning River. It passes through the village of Struthers, where a nuisance in the stream would be objectionable. Site B is suitable for the location of sewage purification works provided the works include intermittent sand filters as a final treatment. By this provision the possibility of producing an insufficiently purified effluent would be obviated.

Site C. This site is located about 10,000 feet north-east of Poland and about 1,000 feet west of Site B. The land upon which it is situated drains naturally into a small stream which parallels Yellow Creek, flowing into the Mahoning River about 1,000 feet below the village limits of Struthers. This site is suitably located as regards habitations, being 1,500 feet from the nearest house, and is in wooded land where it would be obscured from view. The effluent from a plant on this site will not reach Yellow Creek and the stream receiving it although of small flow passes through a district which is sparsely populated. This site is satisfactory for the location of a plant which will purify the sewage beyond the condition of putrescibility.

ACTION OF THE BOARD.

At its meeting held May 9th, 1912, the plans for proposed locations for sewage purification works for Kirtland Farm, received May 6th, 1912, from Mr. R. Winthrop Pratt, consulting engineer, were considered and the same were referred to the engineering committee, with power to act.

On May 10th, 1912, the engineering committee took the following action:

- 1st. To disapprove Site A. as a location for sewage purification works;
- 2nd. To approve Site B. as a location for sewage purification works providing a plant including intermittent filters for final treatment be installed; and,
- 3rd. To approve Site C. as a location for sewage purification works providing a plant including intermittent filters or contact filters for final treatment be installed.

This action was confirmed by the Board at its meeting held June 19th, 1912.

REPORT ON PROPOSED ADDITIONAL SEWERAGE FOR LAKESIDE.

On June 6th, 1912, a communication was received from Mr. Otto H. Magly, secretary and superintendent of The Lakeside Campmeeting Association, requesting approval for additional sewerage for Lakeside. In anticipation of this request, the principal assistant engineer visited Lakeside on April 24th, 1912, and made an examination of the existing sewerage and the proposed improvements. The following report was submitted:

Lakeside is an unincorporated community located in Ottawa County on the shore of Lake Erie. Its steady population during the year is less than 100, but during the summer season the population may reach 5,000 by the temporary occupation of summer cottages. During the past ten years the sanitary conditions of Lakeside have been given frequent attention by the State Board of Health owing to the prevalence of typhoid fever. The Lakeside authorities after repeated advice from the Board, in 1911 installed a mechanical filter plant for the purification of the water supply. In the approval of plans for this plant was included the following statement:

"You are notified further, that the Board also voted to require that the sewage of Lakeside be screened and that the iron outlet pipe be extended at least 1,100 feet from the shore line, said pipe to terminate in several outlets. This screening and extension, likewise, to be done before the 1911 season opens, and plans for the screen chamber to be submitted to the Board on February 23rd, 1911."

Since the installation of the improved water supply, no steps have been taken to improve the method of disposal of the sewage as directed by the Board.

Existing Sewerage. At the present time Lakeside is provided with about 1.8 miles of sewers which furnish drainage facilities for the central and westerly portions of the community. The sewers are constructed of 6-inch to 12-inch vitrified pipe and discharge into a small settling tank at the shore of the lake in the extreme westerly portion of the community. The sewers have been poorly constructed, without manholes, and are improperly flushed. There have been made approximately 200 connections.

The settling tank, into which the sewage is discharged, is 8 feet in diameter by 8 feet deep, constructed of brick laid in cement mortar. The outlet is of 6-inch cast iron pipe, discharging into the lake at a distance of about 150 feet from the shore, at which point the water has a depth of 10 feet. The outlet is about 2,400 feet west of the waterworks intake. Examinations in the vicinity of the outlet have shown the effect of the discharge of sewage and there are frequently marked evidences of sew-

age along the shore. These conditions make the beach unsuitable for bathing, but owing to ignorance of the location of the sewer outlet, bathers occasionally use the beach at this point.

Proposed Additional Sewerage. The plan for proposed additional sewerage was first brought to the attention of the Board April 26th, 1912, when Mr. R. C. Schroth, Jr., engineer for the association, submitted a plan for a septic tank to receive the sewage from a proposed new sewer for the easterly portion of the community. The proposed location for the septic tank was 1,000 feet west of the waterworks intake, and therefore the water supply would be endangered. The engineer and the secretary of The Lakeside Campmeeting Association were advised that the location of the tank at the point proposed would constitute a danger to the water supply, and that the proposed additional sewerage should be connected with the existing sewers. By this means the sewage from the community would be discharged through a common outlet 2,400 feet west of the intake, where a new septic tank could be constructed. Following this advice, steps were taken to prepare plans for connecting the proposed additional sewer to the existing sewers.

The total length of the proposed additional sewer, which will serve the easterly portion of the community, is 1,200 feet. The sewer will be constructed of 12-inch vitrified pipe and will ultimately serve as a main trunk sewer for the extension of the community in an easterly direction. It is estimated that twenty connections will be made immediately, and that ultimately there may be 100 or more connections. The sketch accompanying the request received June 6th, 1912, provides for the installation of a 3-inch centrifugal pump electrically driven, to lift the sewage into the existing sewers. The operation of this pump will avoid the discharge of sewage near the waterworks intake and will provide for the collection of all of the sewage from the community at one point.

The proposed sewer was not designed by an engineer and is to be constructed in the same manner as the old sewer, without manholes, established grades, or methods of flushing. It is important that better design and construction be obtained.

SUMMARY.

From the foregoing report it will be noted that following the advice of the Engineering Department, the plan of discharging sewage through a septic tank at a point 1,000 feet west of the waterworks intake, has been abandoned and that it is now proposed to connect the additional sewer with the existing system. The present method of disposal of sewage at Lakeside is unsatisfactory and results in the creation of objectionable conditions in the vicinity of the outlet. An improved method of disposal of the sewage is necessary and should be installed at as early a date as possible. The intention to proceed with the preparation of plans for this improvement is expressed in the communication received

June 6th, 1912, from the secretary and superintendent of The Lakeside Camp Meeting Association.

ACTION OF THE BOARD.

At a meeting held June 19th, 1912, the State Board of Health considered the question of additional sewerage for the easterly portion of Lakeside, to be connected with the existing sewers by pumping facilities, as outlined in a communication received from Mr. Otto Magly, secretary and superintendent of the Lakeside Campmeeting Association, on June 6th, 1912, and the same was approved subject to the following conditions:

1st. That plans for the purification of the sewage from Lakeside be submitted to the State Board of Health for approval not later than September, 1912, and that a purification plant be installed prior to June 1st, 1913;

2nd. That during the present season the sewage be disinfected with hypochlorite of lime in a manner satisfactory to the State Board of Health, before its discharge into the lake; and,

3rd. That the proposed sewers be built according to an established grade, and provided with manholes at changes of grade and direction, and flushing facilities.

The Board also advised that sewers to be constructed in the future should be designed by a competent engineer to secure good grades, ventilation, and means of flushing.

REPORT ON PROPOSED SEWERAGE AND SEWAGE PURIFICATION FOR THE LIMA STATE HOSPITAL.

On April 1st, 1912, detailed plans for proposed sewerage and sewage purification for the Lima State Hospital were submitted by Mr. E. G. Bradbury, consulting engineer. On April 8th, a copy of the specifications for the same was received. On April 9th, the principal assistant engineer visited the site and made an inspection of the proposed improvement. The plans were examined in the engineering department and the following report was submitted:

The Lima State Hospital, an institution in progress of construction, is intended for the detention of the criminal insane of the state. The site of the institution has an area of 610 acres and is located about two miles north of the northerly corporation limits of Lima, immediately west of the tracks of the C. H. & D. Railway, D. T. & I. Railway, and Ohio Electric Railway. Sugar Creek, a tributary of the Ottawa River, which it joins sixteen miles to the north-east, flows through the extreme north-easterly corner of the site. The topography is rather flat except at the north-easterly corner where there is a fall of 38 feet in a distance of 1,600 feet to Sugar Creek. Drainage from the site takes place in a general north-easterly direction to the creek. The surface deposits are of

a clayey nature and but slightly waterbearing, and the underlying geological formation is limestone, which is encountered a short distance from the surface.

The institution when completed will consist of an administration building, a large main building for the inmates, a domestic group for housing the servants and attendants, and a power house. The ultimate population for which the institution is designed is 2,000, but it is thought that for a few years the population will not exceed 600. Thus far no water supply has been installed, although a test well has been drilled into the waterbearing limestone formations. This may be utilized, or in event of its failure the water supply of Lima may be obtained.

Proposed Sewerage and Sewage Purification.

The design of the sewers for the institution provides 1,640 feet of 8-inch vitrified pipe, and 2,040 feet of 12-inch vitrified pipe. This length includes the main sewer to the screen chamber. In the construction of the sewers extreme care is to be taken to avoid the inflow of ground water, and the specifications provide for the use of an asphaltic compound in sealing the sewer vents. The sewers will be provided with manholes at all changes of grade or direction, placed at an average distance of 230 feet apart.

The design of the sewage purification works includes a screen chamber, a septic tank of the Imhoff type, a sludge filter, a group of contact filters, and a group of intermittent filters.

The plant is designed for an ultimate population of 2,000, and with an assumption of 125 gallons per capita for an ultimate sewage flow of 250,000 gallons per day. It is proposed to construct only a portion of the plant at the present time to provide for a population of 1,200, or a sewage flow of 150,000 gallons.

Screen Chamber. In the line of the main sewer, 160 feet above the septic tank, a small concrete screen chamber will be placed to free the sewage of the coarser matter. The screen chamber will be 3 feet by 3 feet in plan and 3 feet deep. It will be covered by a wooden-hinged door flush with the surface of the ground. The screen will be constructed of $\frac{1}{2}$ -inch by $\frac{3}{4}$ -inch rods and will have open spaces of 1 inch. It will be inclined at an angle of 60 degrees to the horizontal. The sewage enters the screen chamber one foot above the floor and leaves it at the floor level; thus no standing sewage will remain in the chamber.

Septic Tank. The septic tank is of the Imhoff type. The plans provide a concrete structure cylindrical in shape to a depth of 19 feet 5 inches below the flow line and below this point its bottom is a hollow inverted cone. The total depth of the tank to the apex of its conical bottom is 28 feet 3 inches. The sedimentation compartment of the tank is separated from the sludge compartment by false bottoms sloping to a line through the center of the tank 12 feet 3 inches below the flow line.

The false bottoms are to be constructed of 2-inch cypress planks thoroughly calked with hemp and covered with an asphalt paint. Two slots about 10 inches in width will be left at the bottom of this false work to provide for the removal of the solids into the sludge compartment below. For the present installation it is proposed to place the false bottom so as to give a capacity to the sedimentation compartment of 12,500 gallons, representing a 2-hour period on the basis of 150,000 gallons daily flow. Ultimately the false bottom will be lowered to give a capacity to the sedimentation compartment equal to a 2-hour period of flow. This change will be accomplished by inserting timber supports in niches which will be left in the concrete walls. It would be advisable to immediately construct the false bottom at the depth provided for in the design for the ultimate flow.

The sludge compartment has a total capacity of 1,800 cubic feet and is designed for four months' storage of the sludge. The usually accepted figure of 0.0035 cubic foot of sludge per capita per day is exceeded somewhat in the basis of the design. The sludge will be removed at intervals of about one month through an 8-inch cast iron pipe which extends from the central lower portion of the compartment to the sludge filter. For the present no water agitation will be employed but will be installed if found necessary. The design provides a static head of 4 feet for the removal of the sludge. In operation, the screened sewage will enter the tank through 3-inch pipes placed $13\frac{1}{2}$ inches center to center in the bottom of a trough extending across the inlet end of the tank. By this means the inflow will be directed downwards, and it is thought by the consulting engineer that a satisfactory distribution of the flow will be obtained in this way without the use of baffles.

Sludge Filter. The sludge filter will be adjacent to the septic tank and will be constructed in excavation with earth embankments. The design provides a filter 27 feet by 15 feet at the sand line with an area of 405 square feet. The filtering material will consist of 6 inches of fine material at the surface, which may be sand or cinder screenings; 6 inches of contact material, which may be cinders or crushed stone; and the bottom 8 inches will consist of stone $\frac{1}{2}$ inch and 2 inches in dimensions.

The area of the sludge filter is such as to accommodate a dose of 245 cubic feet, which is ample to permit of removal of the sludge from the tanks at intervals of one month or more. On the basis of $\frac{1}{8}$ square foot per capita tributary, the area of the sludge filter is sufficient.

Contact Filters. The design of the contact filters provides for five triangular units arranged in a pentagon around a central control chamber. The effluent from the septic tank will be conducted through an automatic controlling device by the operation of which the flow will be applied in sequence to each of the filters. For the present installation it is intended to install **only three of the units**. The area of the complete installation is $\frac{1}{3}$ acre and for immediate construction $\frac{1}{5}$ acre, both of which represent a

population tributary of 6,000 per acre, or a rate of treatment of 750,000 gallons per acre per day. The filtering material, for which alternate bids will be received, will consist of screened cinders $\frac{1}{4}$ to $\frac{3}{4}$ inch in size, or crushed limestone of the same dimensions. This will be 4 feet 2 inches in thickness and will rest upon an 8-inch layer of screened cinders or crushed limestone with dimensions of $\frac{1}{2}$ inch to 2 inches. The sewage will be applied at the surface by means of cypress distributors discharging at the center of each unit. The effluent will be collected through a **system of underdrains leading** to timed siphons which will control the time of contact and the discharge of each filter.

Intermittent Filters. For the final treatment of the contact filter effluent the design provides for intermittent filters. Ultimately 4 units, with a total area of $\frac{1}{3}$ acre, will be provided, but for the present installation it is intended to construct only two of these units. The filters are to be surrounded by earth embankments and will be located about 225 feet from the contact filters. The automatic application of the sewage using the contact filter as a dosing tank will, therefore, not be employed, and hand-operated gates are provided to deflect the flow to the intermittent filter in service. The units are each 56 feet by 67 feet in plan, with an area of 3,752 square feet, which area will be flooded to a depth of about 1 foot at the discharge of a contact filter unit. Owing to the degree of purification of the contact filter effluent, especially if cinders are used for filtering material, this flooding will not be serious to the intermittent filters. If, however, stone is used in the contact filters and sand in the final filters, this depth of flooding will be serious to the latter. The filtering material proposed for use will have a thickness of 3 feet and will consist of screenings from the cinders to be used as contact material, or of sand in case stone is used in the contact filters. To accomplish surface distribution, which is especially necessary if screenings are used, two points of discharge at the surface of each unit are provided. This will assist in the uniform utilization of the filters.

Disposal of Effluent. The effluent from the final filters will discharge into an open ditch which follows an easterly course to Sugar Creek, into which it empties 600 feet northeast of the plant. Sugar Creek has a watershed area above this point of 26 square miles and its extreme dry weather flow is slight. With a degree of purification which should be secured in the operation of the plant designed, no objectionable conditions will result in the stream. Owing to the small dry-weather flow, however, any interruption in the regular operation of the plant will immediately create objectionable conditions.

ACTION OF THE BOARD.

At a meeting held April 11th, 1912, the State Board of Health approved the plans for proposed sewerage and sewage purification for the

Lima State Hospital, submitted by Mr. E. G. Bradbury, consulting engineer, April 1st, 1912, subject to the following conditions:

1st. That the sewage purification plant be constructed and ready for operation before connections to the proposed sewers are made;

2nd. That the plant be altered, enlarged, or repaired, whenever in the opinion of the State Board of Health such alteration, enlargement, or repairs become necessary;

3rd. That in case broken stone is used as a filtering material in the contact filters, sand be used as a filtering material in the intermittent filters;

4th. That samples of all filtering material be submitted to and receive the approval of the engineer of the State Board of Health;

5th. That detailed plans of the automatic controlling apparatus be submitted to the State Board of Health, and that its operation be at all times satisfactory to said Board; and,

6th. That this approval be void unless contracts for the construction of the sewers and sewage purification plant shall have been awarded prior to October 1st, 1912.

The Board also recommended that the consulting engineer be advised as follows:

(1) That the false bottom of the sedimentation compartment of the tank should be placed at the depth provided in the design for the ultimate population; and,

(2) That screened cinders should be given preference over broken stone as filtering material in the contact beds.

REPORT ON PROPOSED STORM SEWERAGE FOR LINDEN HEIGHTS.

On August 14th, 1912, plans and specifications for proposed storm sewers were submitted to the State Board of Health by a committee on drainage for Linden Heights through Mr. R. K. Schlafly, engineer for the village. The plans were referred to the engineering department, and on August 20th, 1912, the principal assistant engineer visited Linden Heights to make the necessary investigation. The following report was submitted:

The village of Linden Heights, a suburb of Columbus, is located $4\frac{1}{2}$ miles north of the center of that city. The population, as based on the 1910 census report, is about 1,000. The area within the corporation limits is 260 acres. It is probable, however, that this area will be increased in the near future by the addition of adjoining territory. The village is essentially a suburban community and has no municipal improvements.

The topography of the village and surrounding country is flat. Natural drainage from the village is in a south-easterly direction to Alum Creek which is 2.5 miles distant. There is an area of about 30 acres

in the western portion of the village which drains in a south-westerly direction to the Olentangy River, which is about two miles distant. Below the village both streams pass through the city of Columbus.

Past Actions of the State Board of Health. On March 15th, 1909, plans for a proposed storm sewer system for the village were presented by Messrs. Bradbury and Shute of Columbus. These plans were considered by the Board at a meeting held April 22nd, 1909, and approved with the following conditions:

"1st. That the village council pass and file with the State Board of Health an ordinance forbidding the tapping of all sewers shown on plans submitted and any future sewers tributary thereto, for the purpose of admitting water closet wastes, sink drainage, or household wastes of any kind.

That this approval be void after May 1st, 1910, unless construction of the sewers is commenced before that date."

On January 11th, 1911, a request was made by the village solicitor for an extension of time for constructing the proposed system of sewers. In considering this request, the Board voted to grant an extension of time for completing the sewer to May 1st, 1912, but to refuse permission to tap the sewer for sink drainage. The local officials were notified that the proposition to connect branch house sewers and cellar drains with the proposed storm-water sewers which would be wholly dry, excepting for house sewage, for weeks and months at a time, is objectionable and insanitary and is bound to be the cause of nuisance and offense to the people of the village. Nothing was done toward carrying out the above plans.

Proposed Storm Sewers. The plans recently submitted provide for a system of storm-water sewers, and it is proposed by the local council to so limit its use by proper ordinances. The sewers will be located in the alleys of the village and, as above mentioned, will be used only for storm-water purposes and cellar drainage. It is the intention, however, at some time in the future to convert the proposed system into a sanitary sewerage system, following the installation of storm sewers, which will be located in the streets. The most urgent demand for sewerage at present is for cellar drainage and the removal of surface water.

The proposed plans contemplate the installation immediately of 4.74 miles of sewers, all of which will be located in that portion of the village west of Cleveland Avenue. Plans have been prepared for sewers in the district east of Cleveland Avenue, comprising the installation of 1.58 miles of 8-inch and 12-inch sewers. The sewers to the east of Cleveland Avenue will not be installed in the near future as the demand for drainage in this district is not so urgent.

The sewers will consist of vitrified sewer pipe ranging in size from 8 to 24 inches to be laid with well-cemented joints. Manholes will be located at all changes of grade and direction, there being some fifty, as shown on the plans submitted. Surface drainage from the streets will be

conducted to the sewers through seventeen catch basins which will connect to the sewers by means of short drains. Provision is being made for 1,160 sewer connections. It is thought that approximately 400 connections will be made within the first year the sewers are in use. The maximum depth of the sewers will be 13 feet and the minimum 5.8 feet, the average will be approximately 7.4 feet. The grades of the sewers are such as to afford self-cleansing velocity of flow, although in this respect much will depend upon the care of construction. Sink drainage or sanitary wastes will not be permitted to be discharged into the sewers. It was learned during the recent visit that the village would adopt ordinances as soon as the sewers are installed prohibiting connections for such use.

The outfall sewer through which drainage from the proposed system will be discharged consists of 24-inch pipe sewer laid on a 0.4 per cent. grade. This sewer will extend along the west side of the Cleveland, Akron and Columbus Railroad, and will discharge at a stone culvert under the railroad at a point 800 feet south-east of the village. At the time of the visit the proposed outlet was inspected and it was found that the ditch into which the proposed sewer will discharge had rather slight fall for a distance of approximately 1,500 feet to the east. This receives only surface drainage and was in a very clean condition at the time of the inspection. The ditch in its lower portion forms a small stream which discharges into Alum Creek, near the Johnstown Road bridge, $2\frac{1}{2}$ miles south-east of the Cleveland, Akron and Columbus Railroad. Immediately above its confluence with the creek the stream passes through the grounds of St. Mary's of the Springs, a convent for educational purposes.

The fall in the ditch from the railroad culvert to the east, as above stated, is rather slight and it is questionable whether a suitable site is available for a sewage disposal plant should such be deemed necessary in the future. It was stated by the engineer for the village that such site is available at a point 300 feet north of Mock Road and east of the Cleveland, Akron and Columbus Railroad. However, the proximity to habitations and the highway would make this site rather undesirable, especially in view of the fact that the territory in this vicinity will undoubtedly become thickly settled within the next few years. The only suitable site for a sewage disposal plant would be a point some 2,000 feet southeast of the railroad culvert and in the valley of the ditch. There is a possibility of the sewer system of Linden Heights connecting with the Columbus city sewers; however, no data is available at present showing the feasibility of making such a connection.

SUMMARY.

Briefly summarized, the proposed system of storm sewers, as shown on the plans submitted by Mr. R. K. Schlafly, engineer for the village

of Linden Heights, is well designed and in every way suitable for the purpose intended. It is thought that no objectionable conditions will be created in the ditch into which the proposed system will discharge provided that the sewers receive only storm water and cellar drainage. It is the intention of the village to convert the proposed system to sanitary purposes when the demand for drainage facilitates for such wastes becomes more urgent and subsequent to the installation of a system of storm sewers which will be located in the streets.

ACTIONS OF THE BOARD.

At a meeting held September 12th, 1912, the State Board of Health approved the plans for a proposed system of storm sewers for Linden Heights, submitted on August 14th, 1912, by Mr. R. K. Schlafly, engineer for the village, subject to the following conditions:

1st. That the village council pass an ordinance restricting the use of the sewers, permitting connections for surface drainage, cistern overflows, downspouts from the roofs and cellar drainage; and prohibiting connections for closet wastes, sing drainage, household wastes of any kind, and cesspool overflows; and providing that cellar drains shall be constructed of field tile placed outside the foundation walls with no connection to the interior of the cellar; and that the proposed ordinance be approved by the Secretary of the State Board of Health before its passage.

2nd. That immediately following the installation of storm sewers in the future, the proposed system to be installed at present be converted into a system of sanitary sewers by disconnecting therefrom catch basins, downspouts, and cistern overflows, and providing continuance of cellar drain connections and the installation of house connections; and that plans and specifications showing the proposed method of converting the system of sewers and of disposal of the sewage, be submitted to and receive the approval of the State Board of Health before the conversion is made.

3rd. That this approval shall be void after October 1st, 1913, unless construction of the proposed sewers shall have been commenced prior to that date.

At the meeting of the State Board of Health held October 23rd, 1912, the mayor, chairman of drainage committee of council, and the village solicitor, appeared with a request for a modification of the terms of the Board's approval of a system of storm sewers for Linden Heights, given September 12th, 1912. The Board voted to permit the installation of inside cellar drains subject to the following conditions:

1st. That the council of the village of Linden Heights pass an ordinance providing for a cellar drain inspector, defining his duties and his authority;

2nd. That the ordinance as drawn for passage be submitted to and approved by the Secretary of the State Board of Health; and,

3rd. That on passage of the ordinance a reliable person be appointed to the office.

REPORT ON PROPOSED LOCAL SANITARY SEWER NO. 1,
MAIN SEWER DISTRICT NO. 2, IN GRADOLPH
AVENUE, WEST TOLEDO, LUCAS COUNTY,
ADAMS TOWNSHIP.

On November 21st, 1912, Mr. Wm. H. Gould, civil engineer, of Toledo, submitted plans and specifications for a proposed sewer in Gradolph Avenue, West Toledo. On December 6th, 1912, one of the assistant engineers visited Toledo and made an examination relative to the proposed improvement. The following report was submitted:

West Toledo is an unincorporated community situated immediately north of Ten Mile Creek, the northerly corporation line of the city of Toledo. The community contains a population of several hundred and also a number of packing houses, fertilizer works, and establishments of a similar character. Sibley Creek, a small tributary of Ten Mile Creek, forms the natural northerly border of the community.

Past Actions of the State Board of Health. Numerous complaints have been received by the State Board of Health during the past few years against the polluted condition of Sibley and Ten Mile Creeks. The investigations have shown that Sibley Creek is polluted by domestic sewage from West Toledo and also by wastes from the various industrial establishments. Ten Mile Creek has been found to be polluted seriously by sewage from the city of Toledo and it also receives some sewage from West Toledo.

In August, 1912, the State Board of Health declared the necessity of a main sanitary sewer in Main Sewer District No. 2, Lucas County, and directed that the necessary plans and specifications for a main sewer and sewage purification plant be prepared and submitted to the Board for approval. Main Sewer District No. 2 includes the area lying between Sibley and Ten Mile Creeks, embracing the entire community of West Toledo. The plans and specifications required by this action of the Board have not been submitted.

Proposed Sewer. In advance of the preparation of plans for a main sewer for district No. 2, it is desired to install a short sewer in Gradolph Avenue, West Toledo, to serve a number of residences already constructed or contemplated. The sewer will be constructed at the expense of the property owners benefited, and will become subject to the jurisdiction and supervision of the board of county commissioners. The ultimate population which may become tributary to the sewer is 150, and it is proposed to construct the sewer for sanitary purposes strictly. The sewer consists of 780 feet of 10-inch and 12-inch vitrified pipe, and will be connected, at its lower end, to an existing sewer in Detroit Avenue which discharges into Ten Mile Creek. The Detroit Avenue sewer is 1,500 feet in length, 15 inches in diameter, and was constructed sev-

eral years ago by private interests without the approval of the State Board of Health. At the present time it receives a rather large amount of sewage and contributes to the pollution of Ten Mile Creek.

By the construction of a main sewer or intercepting sewer in district No. 2, the Detroit Avenue outlet as well as numerous other outlets will be intercepted and the dry weather flow will be carried down stream to a suitable site for purification works. The use of the proposed sewer in Gradolph Avenue will not noticeably increase the pollution of Ten Mile Creek, but the Board should insist upon the immediate submission of plans for a main sewer for the district.

ACTION OF THE BOARD.

At a meeting held December 12th, 1912, the State Board of Health approved the plans and specifications for a proposed sewer in Gradolph Avenue, West Toledo, known as local Sanitary Sewer No. 1, Main Sewer District No. 2, submitted by Mr. Wm. H. Gould, civil engineer of Toledo, on November 21st, 1912, subject to the following conditions:

1st That the board of county commissioners of Lucas County have prepared and submitted to the State Board of Health prior to April 1st, 1913, plans and specifications for a main sewer or sewers and sewage purification works in Main Sewer District No. 2, Lucas County, the necessity for which was declared in a resolution adopted by the State Board of Health August 15th, 1912; and,

2nd. That this approval shall be void unless the proposed sewer shall be installed prior to June 1st, 1913.

REPORT ON THE NECESSITY FOR SANITARY SEWERAGE FOR MAIN SEWER DISTRICT NO. 2, LUCAS COUNTY, NEAR TOLEDO.

At a meeting of the State Board of Health held June 19th, 1912, the following petition under the Bense Act was submitted by the clerk of Washington Township, Lucas County:

"To the Ohio State Board of Health:

I, the undersigned, clerk of Washington Township, Lucas County, State of Ohio, do hereby certify that the trustees of said township, being in session on the 19th day of June, 1912, adopted a resolution of which the following is a true copy:

RESOLVED, That the Board of County Commissioners, of Lucas County, Ohio, is discharging and permitting to be discharged, sewage and other wastes into Sibley Creek, and by reason thereof has so corrupted said Sibley Creek as to give rise to foul and noxious odors, thereby creating conditions that are detrimental to the health and comfort of the citizens of Washington Township, Lucas County, Ohio, who reside in the vicinity of said creek.

The State Board of Health is hereby respectfully requested to investigate the conditions complained of, and to require the said County Commissioners, to install such works or means for purifying or otherwise disposing of its sewage

and other wastes as may be determined by said board, in accordance with 'An Act to authorize the state board of health to require the purification of sewage and public water supplies and to protect streams against pollution,' passed April 7th, 1908.

(Signed) I. A. BOLTON,
*Clerk, Washington Township,
Lucas County, Ohio.*

(Signed) C. E. UPTON,

(Signed) JOHN F. PROBECK,

(Signed) EDWARD MATZINGER."

June 19th, 1912.

Dr. Oscar Hasencamp, vice-president of the Board, and Mr. W. H. Dittoe, chief engineer, were appointed a committee to investigate the conditions complained of. On June 29th, 1912, the committee made an examination of the stream, and the following report was submitted:

Sibley Creek is a small stream which flows in a general easterly direction a short distance north of the city of Toledo, paralleling Ten Mile Creek, which it joins at a point $7\frac{1}{2}$ miles above the mouth of the latter stream. Ten Mile Creek has a watershed area of about 90 square miles and is seriously polluted by sewage from the city of Toledo. Sibley Creek has an elongated watershed, 2.8 square miles in area, $5\frac{1}{2}$ miles in length and $\frac{1}{2}$ mile in average width. At all times except following heavy precipitation, the flow of the stream is small, and during extended dry periods there is practically no flow. Near the point of confluence with Ten Mile Creek, the channel of the stream widens and is composed of slack water, the elevation of which fluctuates with that of Lake Erie. It is in this portion of the stream that the serious conditions complained of exist.

Sources of Pollution. The examination of the stream consisted in following its course from a point near its mouth to a point two miles above. Along the lower portion of the stream, large volumes of wastes from manufacturing establishments are discharged. The principal establishments contributing pollution to the stream are the Zehner Brothers Packing Company, a large slaughtering establishment; the Ruedy Packing Company, a somewhat smaller slaughtering establishment; the Toledo Union Stock Yards Company; and the Le Roux Cider and Vinegar Company. At the Sehner Brothers Packing Company, large volumes of concentrated wastes are discharged without purification into the stream. On the day of inspection a 12-inch sewer was flowing over half full, and this flow exceeded greatly the flow of the stream itself. It is stated that at times there are discharged large quantities of bloody wastes, which of course create very objectionable conditions at the outlet. At the Ruedy packing house, a small volume of waste was being discharged into a ditch leading to the stream. The conditions at the sewer outlet were not so objectionable as at the sewer outlet from the Zehner Brothers establishment, but nevertheless contributed to the pollution of the stream. The

wastes from the Toledo Union Stock Yards consist of the stall and barn-yard drainage which at times is large in amount. At the Le Roux Cider and Vinegar Company, no wastes were being discharged into the stream as the operations of the plant have not yet been begun.

Above these industrial establishments, several privately constructed sewers draining the unincorporated community of West Toledo, discharge into Sibley Creek. From two of these sewers, domestic sewage is emptied in sufficient quantities to seriously pollute the stream. At the time of the inspection, however, no very objectionable conditions were found in this upper portion of Sibley Creek.

Condition of Sibley Creek. In its upper portion, above the industrial establishments, Sibley Creek is not seriously polluted at the present time. It is claimed, however, that in extreme dry weather the discharge of sewage from West Toledo creates objectionable conditions. The manufacturing establishments pollute the stream to such an extent that it has the appearance of an open sewer. The water is dark colored, contains sludge and suspended matter, and gives off extremely foul odors. The displacement of the stream occurs at rare intervals owing to the small flow, and this in warm weather increases the objectionable conditions.

SUMMARY.

A review of the conditions described in the foregoing report, shows that Sibley Creek is somewhat polluted by sewage from West Toledo and is seriously polluted by wastes from manufacturing establishments located along the lower portion of the stream. It is evident that the discharge of sewage and manufacturing wastes into the stream is not a condition for which the county commissioners of Lucas County are responsible, and it does not appear logical that they should be ordered to abate the nuisance. Conditions in the upper portion of the stream could be improved by the construction of a sanitary sewer following the valley of Sibley Creek, to receive the sewage from West Toledo and carry it to a proper point of disposal.

ACTION OF THE BOARD.

At a meeting of the State Board of Health held July 18th, 1912, this report by the special committee appointed to investigate the alleged pollution of Sibley Creek was presented. The report and recommendations of the committee were adopted, said recommendations being as follows:

(1) That an investigation of Sibley Creek shows the stream to be seriously polluted near its mouth by wastes from industrial establishments, and mildly polluted in its upper portion by sewage from West Toledo.

(2) That the county commissioners of Lucas County are not responsible for the condition of the stream, and that there is no cause for requiring them to abate the nuisance.

(3) That the abatement of the nuisance arising from the industrial establishments is clearly within the power of the township trustees.

(4) That conditions in the upper portion of Sibley Creek could be improved by the construction of a sanitary sewer by the county commissioners, to receive the sewage from West Toledo and carry it to a proper point of disposal.

July 10th, 1912, there was received from Mr. William H. Gould of Toledo, county sanitary engineer, a copy of a resolution adopted by the county commissioners of Lucas County, asking the State Board of Health to declare the necessity of sewerage in the district in Lucas County adjoining Toledo.

. ACTION OF THE BOARD.

At a meeting held August 15th, 1912, the State Board of Health declared the necessity for sanitary sewerage for Main Sewer District No. 2, Lucas County, by the adoption of the following resolution:

WHEREAS, The board of county commissioners of Lucas County, Ohio, pursuant to the provisions of section 1 of an act of the General Assembly of the State of Ohio, passed May 31st, 1911, approved June 8th, 1911, and entitled "An Act authorizing the Board of County Commissioners of the several counties of the state to provide for the construction of sewers outside of the municipalities and to provide for the payment of the cost and expense thereof," have laid out and established Lucas County, Ohio, Main Sewer District No. 2, within that portion of said county which lies within three miles of an incorporated city, to-wit: The lots and lands in that part of Town 9 South, Range 7 East, Michigan Survey, in Lucas County, Ohio, lying and being within the following described boundaries, to-wit:

Beginning at a point where the East and West center line of Section 13 intersects the Northwest shore of Ten Mile Creek (Ottawa River, so-called); thence West along the center lines of Sections 13, 14 and 15, to the center of Section 15; thence, South along the North and South center line of Section 15 to the North line of Section 22; thence, East along the North line of Section 22 to the West line of Section 23; thence, South along the West line of Section 23 to the Northwesterly shore of Ten Mile Creek (Ottawa River, so-called); thence, Northeasterly along the Northwesterly shore of Ten Mile Creek, (Ottawa River, so-called) to the place of beginning, and,

WHEREAS, This Board, upon investigation finds that a main sewer is necessary in the above described district, therefore,

Be it resolved, That pursuant to the provision of Section 2, of an Act of the General Assembly of the State of Ohio, passed May 31st, 1911, approved June 8th, 1911, and entitled, "An Act authorizing the Board of County Commissioners of the several counties of the State to provide for the construction of sewers outside of the municipalities, and to provide for the payment of cost and expense thereof," it is necessary to construct a main sewer in Lucas County, Ohio, Main Sewer District No. 2, and,

Be it further resolved, That the board of county commissioners of Lucas County, Ohio, are hereby respectfully requested to have prepared the necessary plans and specifications for a main sewer and sewage purification plant in Lucas County, Ohio, Main Sewer District No. 2, and submit the same to this Board for approval.

REPORT OF PROPOSED ADDITIONAL SANITARY SEWERS
FOR MILLERSBURG.

An August 23rd, 1912, plans and profiles for a proposed system of additional sanitary sewers for Millersburg were received from Mr. S. H. Marchand, mayor of the village. On August 27th, 1912, one of the assistant engineers visited Millersburg and made an investigation of the existing sewerage conditions and of the proposed improvement. The following report was submitted:

Millersburg is a village with a population in 1910 of 2,020. It is located in Holmes County on Killbuck Creek, which stream flows in a general southerly direction through the westerly portion of the village. During the past twenty years the village has experienced almost no growth and there is little likelihood of an extensive development in the future. Millersburg is largely an agricultural center and serves as a shipping point for lumber and live stock. The topography of the village and surrounding country is hilly.

In the way of municipal improvements the village is provided with a public water supply installed in 1895, a few miles of paved streets, and a partial system of sanitary sewers. There are also several short storm drains which are misused to some extent to receive domestic sewage.

Existing Sewers. At the present time there are approximately 2.8 miles of sanitary sewers located in the principal streets of the central, northerly and westerly portions of the village. The southerly portion is at the present time without sewerage facilities. The sanitary sewers discharge into Killbuck Creek at three independent outlets. Two of these outlets are located opposite the central portion of the village immediately above and below the Jackson Street bridge, respectively, while the third outlet is located in the extreme southwesterly portion of the village. The outlet immediately below the Jackson Street bridge serves the so-called Adams Street and Court House sewers and was installed about twenty-five years ago, before the State Board of Health had been given jurisdiction in the construction of sewers. The outlet immediately above the Jackson Street bridge serves the so-called Clinton Street sewer and was installed in 1895 without the approval of the State Board of Health. Previous to the construction of this sewer the Board advised the local officials that the proposed location of the outlet was unsatisfactory and that the sewage should be carried to a point farther down stream. The outlet in the southwesterly portion of the village serves the so-called Mad Anthony Street sewer and was installed in 1901. Plans for this sewer were not submitted to the Board and it was constructed without the Board's knowledge or approval. During 1910 about 4,000 feet of sewers were installed and connected to the Clinton Street sewer without the knowledge or approval of the State Board of Health. From the foregoing it will be noted that practically all of the sewers in Millersburg

have been constructed illegally inasmuch as the approval of the State Board of Health was not secured prior to their installation.

The existing sewers are all laid with good grades but owing to the absence of manholes at changes of grade and direction, some trouble has been experienced in keeping the sewers clean. It is not known what proportion of the population is connected to the existing sewers, nor is any estimate available to indicate the sewage flow.

During extreme low stages of Killbuck Creek the discharge of sewage from Millersburg creates objectionable conditions. At ordinary stages, however, the flow of the stream is sufficient to properly dilute the sewage without the creation of a nuisance. No complaints against the discharge of sewage from Millersburg have ever been submitted to the State Board of Health.

Proposed Additional Sewers. In order to improve the sanitary conditions in the southerly portion of the village, it is proposed to install a system of sanitary sewers for this district. The proposed system will consist of about one mile of vitrified pipe sewers 6 inches to 12 inches in diameter. The design of the proposed system is faulty in that an insufficient number of manholes are provided to permit of inspection and cleaning. The proposed system will connect with the existing Mad Anthony Street sewer at a point about 500 feet above the outlet of the latter sewer into Killbuck Creek. The present population of the district which will be served by the proposed system is about 300, and for the next few years a population of about 100 will become tributary.

SUMMARY.

From the foregoing it will be noted that the village of Millersburg has at various times installed sanitary sewers without the approval of the State Board of Health. The discharge of sewage into Killbuck Creek does not at present create a serious nuisance and it is probable that with the additional sewage flow contributed by the proposed additional sewers no decided nuisance will arise.

The location of the two outlets near the Jackson Street bridge is, however, objectionable and recognition at this time should be given to the necessity of ultimately conveying all the sewage flow from the entire village to one point of outlet and there purifying it before discharging it into Killbuck Creek. If the two outlets near the Jackson Street bridge are abandoned immediately by constructing an intercepting sewer to connect with the existing Mad Anthony Street sewer, it is believed that the outlet of the latter sewer may be used for several years as an outlet for the sewers of the entire village. Ultimately the extension of the Mad Anthony Street sewer to the sewage purification works will be necessary.

With regard to the existing sewers and the proposed additional sewers the design is faulty in that manholes are not provided at intersections,

changes of grade and direction, nor adequate flushing facilities provided. It is apparent that the village should take steps to secure the services of an experienced sanitary engineer to prepare proper plans for sewerage improvements.

ACTION OF THE BOARD.

At a meeting held September 12th, 1912, the State Board of Health considered the plans for a proposed system of additional sanitary sewers for Millersburg, received August 23rd, 1912, from S. H. Marchand, mayor of the village, and they were approved subject to the following conditions:

1st. That prior to the connection of the proposed system of sewers to the Mad Anthony Street sewer, the village have prepared and submitted to the State Board of Health plans and specifications satisfactory to said Board for a sewage purification plant, including an intercepting sewer to collect the sewage flow from the entire village at one point of outlet;

2nd. That a portion of the intercepting sewer to provide for the temporary discharge of the sewage flow from the entire village at the existing outlet of the Mad Anthony Street sewer be constructed prior to July 1st, 1913;

3rd. That the intercepting sewer be completed and the sewage purification plant be constructed at a location satisfactory to the State Board of Health when deemed necessary by said Board; and,

4th. That this approval shall be void unless plans for a sewage purification plant, including intercepting sewer, shall be submitted prior to January 1st, 1913.

The authorities were advised that the above mentioned plans should be carefully prepared in detail and that the design of the sewers and sewage purification plant should incorporate all of the modern features; also that in the opinion of the State Board of Health, the design of the existing and proposed sewers was faulty in that inadequate flushing facilities and an insufficient number of manholes were provided.

REPORT ON PROPOSED ADDITIONAL SEWERAGE FOR MT. VERNON.

On July 5th, 1912, a general plan showing the location of proposed additional sewers for Mt. Vernon was submitted by Mr. Ray S. Blinn, city engineer. On July 10th, 1912, a formal request for approval of the plan was received from Mr. Charles M. Fairchild, director of public service. On July 5th, 1912, the principal assistant engineer visited Mt. Vernon and made a general examination of the present sewerage and proposed improvements. The following report was submitted:

Mt. Vernon is located in Knox County on the Kokosing River, which forms the southerly corporation line of the city. The population in 1910 was 9,087, and at the present time the city is experiencing a flourishing growth. The topography within the city and in the surrounding country

is hilly. Although the city is one of the oldest residential communities in the state, it has few municipal improvements. A public water supply was installed in 1882, being obtained from drilled wells, and less than one mile of the streets is paved. The present sewers cover only a small portion of the city.

PREVIOUS ACTIONS OF THE STATE BOARD OF HEALTH.

Proposed sewerage for Mt. Vernon was first brought to the attention of the Board in 1897 when it was desired to construct sewers in District No. 2. After consideration, the Board approved of the plans as set forth in the following communication of July 14th, 1897, addressed to the sewer committee:

"The State Board of Health has considered your application for approval of plans for sewer district No. 2 of your city, comprising five or six miles of sewers from which storm water is to be excluded, and having an outlet into the Kokosing river.

You are hereby notified that said plans have been approved subject to the condition that this approval shall be considered as temporary, and that the sewage shall be purified in a satisfactory manner when in the judgment of the State Board of Health this shall become necessary."

In 1903 it was desired to extend the sewerage system by constructing sewers in district No. 3. The Board considered the question and on September 3rd, 1903, notice of its action was sent to the president of the board of public service as follows:

"The Board is convinced in the first place that the amount of sewage you are proposing to convey to the river, added to what is already reaching the river from your city, will be too great a burden for the stream to carry, and will cause its pollution. The Board has therefore voted to disapprove plans unless some satisfactory provision is made for purifying the sewage at this time. The Board strongly urges also that your plans should be revised so as to provide a strictly sanitary sewer for District No. 3, with such storm water sewers as may be actually necessary to carry off surface water."

In 1906, the Board considered a proposal to construct sewers in West Vernon, a suburb of Mt. Vernon, submitted by Mr. R. M. Douglass, consulting engineer for the West Vernon Land Company. The action of the Board is set forth in the following communication which was sent to the consulting engineer on August 2nd, 1906:

"The State Board of Health has considered your application for approval of a proposed sewer outlet for the West Vernon Land Company, to discharge sewage into the Kokosing River, as shown upon plans submitted by you July 30, 1906.

You are hereby notified that this outlet is disapproved unless the sewage discharging through it be purified in a manner satisfactory to the State Board of Health."

In 1908, the city employed The Riggs and Sherman Company to make preliminary studies and estimates of cost for a complete system of

sanitary sewers and a sewage purification plant. Briefly, the consulting engineers' report estimated the cost of sewers at approximately \$136,000, and the cost of a purification plant at \$31,000. The city presented no request to the State Board of Health for approval of this plan.

EXISTING SEWERAGE.

The city is divided into four sewer districts which are at the present time inadequately provided with sewerage facilities. District No. 1 is a long narrow strip extending in a northerly and southerly direction through the central portion of the city, and has a population of 1,500. The sewers in this district are built on the combined plan and were installed in 1891, before the State Board of Health had been given jurisdiction in the installation of sewers. The outlet is a 36-inch brick sewer discharging into the Kokosing River at the Main Street bridge. There are also two privately constructed sewers in District No. 1, discharging into the river near Main Street. District No. 2 includes the easterly portion of the city and has an estimated population of 4,500. There are five miles of combined sewers in this district, constructed in 1897. The outlet is an 18-inch sewer entering the Kokosing River in the extreme south-easterly portion of the city. District No. 3 has an estimated population of 3,000 and District No. 4 is at the present time sparsely populated. Neither district is supplied with sewers and the need of suitable drainage and sewerage facilities is urgent, especially in District No. 3. As has been stated previously, combined sewers for District No. 3 were disapproved by the Board in 1903.

The total length of sewers already constructed by the city is 6.6 miles, discharging into the Kokosing River at two outlets. Approximately 2,000 persons are tributary. The examination of July 5th, 1912, revealed the fact that in close proximity to the outlets are accumulations of considerable sewage sludge, but that owing to the rapid flow of the river the evidences of contamination were not apparent a short distance below the outlets.

PROPOSED ADDITIONAL SEWERAGE.

The plan of the city engineer provides for the extension of the existing sewers by the construction of additional sewers in each of the four districts so that ultimately the entire city will be provided with sewerage and drainage facilities. It is not proposed to construct the entire system at the present time, but it is desired to have a comprehensive plan to be followed in all future construction. The plan provides for the installation of combined sewers in all portions of the city. Briefly, the additional sewers will have a total length of 15 miles, making the ultimate length of the sewers 21.6 miles. The additional sewers vary in size from 12 inches to 36 inches and are designed to carry the run-off from a precipitation of 2 inches per hour. The sewers are to be constructed throughout with

vitrified pipe laid with cemented joints. The ultimate population tributary to the proposed additional sewers when the various districts shall have become built up, is estimated at 8,000. The plan of constructing combined sewers in extending the sewerage system of Mt. Vernon is objectionable for several reasons. The necessity of purifying the sewage at present or in the future makes a separate system of sewers desirable and economical. Moreover, the topography is favorable for the construction of short storm sewers, and a separate system may therefore be installed at a smaller outlay than a combined system. Also sanitary sewers, as the name implies, are more easily and at less expense maintained clean and in good condition.

The plan of the city engineer provides for the establishment of three new outlets, two of which are into the Kokosing River and the third into Center Run, a tributary of the river, which passes through the extreme easterly portion of the city. The outlets into the Kokosing River will serve Districts Nos. 3 and 4 and will therefore discharge above the central southern portion of the city. The outlet into Center Run is about one-fourth mile above its confluence with the Kokosing River. Center Run has a very low dry weather flow, entirely inadequate to dilute the sewage which will be discharged at the outlet.

Inasmuch as the plan of the city engineer and the communication from the director of public service received July 10th, 1912, contemplate the disposal of the sewage from the city by dilution, a brief description of the Kokosing River will be given.

Kokosing River. This stream has a watershed area above Mt. Vernon of about 250 square miles. It passes through rather hilly country and its flow following storms fluctuates quite rapidly. No gaging has been made to determine the minimum or average dry weather flow. In the light of available data regarding the flow of streams of a similar character in Ohio, it seems safe to state that the minimum dry weather flow does not exceed 5 cubic feet per second, and that the average dry weather flow does not exceed 35 cubic feet per second. A rough measurement of the flow, made by the principal assistant engineer on July 5th, 1912, indicated that the flow was not in excess of 50 cubic feet per second. At this time it was locally stated that the stream was at medium low stage. Apparently the minimum flow of the stream is insufficient to properly dilute the sewage from a city of 10,000 population.

Above Mt. Vernon the Kokosing River receives no sewage pollution. Several small communities are located along its course and that of its tributaries, but these are not provided with sewerage systems. Below Mt. Vernon are located Gambier and Howard, at distances of 6 and 13 miles, respectively, by the river, and the next community of any size is Coshocton, located at the confluence of the Walhonding and Tuscarawas Rivers, 36 miles below Mt. Vernon. The nearest public water supply is at Zanesville where the raw river water from the Muskingum River is

used. The effect of discharge of sewage at Mt. Vernon upon this water supply, however, is probably negligible. The necessity of purifying the sewage of Mt. Vernon must be judged only with the idea of preventing a nuisance and maintaining as far as possible the natural purity of the stream.

ACTION OF THE BOARD.

At a meeting held July 18th, 1912, the State Board of Health considered this plan for proposed additional sewerage for Mt. Vernon, submitted by the city engineer, Mr. Ray S. Blinn, July 5th, 1912, and voted to withhold its approval of this plan; and to require revised plans for proposed additional sewerage for Mt. Vernon, embracing the following features:

- (1) The provision of separate sewers for future extension of the system.
- (2) The provision of a main sewer to carry the entire sewage flow to one point of outlet.
- (3) The provision of a sewage purification plant satisfactory to the State Board of Health.

The preparation of revised plans in accordance with the above provisions should be based upon a comprehensive study of the local conditions by a competent sanitary engineer.

REPORT ON PROPOSED SEWER AND SEWAGE DISPOSAL FOR THE MUSKINGUM COUNTY CHILDREN'S HOME, NEAR ZANESVILLE.

On March 18th, 1912, plans for a proposed sewer and sewage disposal for the Muskingum County Children's Home, near Zanesville, were submitted by Mr. W. V. Hollingsworth, county surveyor of Muskingum County. Based on information secured at previous visits of representatives of the State Board of Health and upon a review of the plans, the following report was submitted:

The Muskingum County Children's Home is situated about six miles southwest of the center of Zanesville, near Jonathan Creek. This stream flows into Moxahala Creek about one mile east of the institution, and Moxahala Creek follows a northeasterly course, joining the Muskingum River about 4.5 miles below the confluence with Jonathan Creek and immediately south of the city of Zanesville.

The surface drainage from the grounds of the institution is in a northerly and easterly direction to Jonathan Creek.

The Home, which consists of one large building, has a present population of 60, and it is intended to increase the capacity of the institution to accommodate an ultimate population of 100. The water supply for the institution is derived from a spring a short distance northwest

of the building. The spring is well protected from surface contamination by a concrete curbing and presumably furnishes a satisfactory water. At the present time the sewage from the institution is discharged into a leaching cesspool located about 200 feet northwest of the main building.

On July 25th, 1911, plans for sewerage for the institution were submitted by Mr. D. Y. Geddes, engineer for the Home. These plans provided for the construction of a sewer about 2400 feet in length, extending in an easterly direction to Jonathan Creek, where it was proposed to discharge the sewage without treatment.

At a meeting held August 10th, 1911, the State Board of Health disapproved the plans for a proposed sewer for the Muskingum County Children's Home, submitted July 25th, 1911, by Mr. D. Y. Geddes, engineer for the Home, and the Secretary was instructed to advise the directors of the Muskingum County Children's Home to cause to be prepared plans for a suitable sewage disposal plant, and submit the same to the State Board of Health for approval.

At a meeting of the State Board of Health on September 14th, 1911, Mr. W. V. Hollingsworth, county surveyor, appeared before the Board and requested a reconsideration of the action of the Board on August 10th, 1911, disapproving the plans for sewerage for the institution.

At a meeting held October 18th, 1911, the Board considered the request of the County Commissioners for permission to dispose of the sewage from the Muskingum County Children's Home by discharging it into the large existing cesspool on the grounds of the institution until next spring; and voted to grant permission to use said cesspool until May 1st, 1912, and to require that plans for a suitable sewage purification plant be submitted to the State Board of Health for approval not later than February 1st.

On January 31st, 1912, the county surveyor conferred with the engineer of the State Board of Health at Columbus. At this time tentative plans had been prepared providing for the disposal of the sewage from the institution by means of an underground filter or system of absorption tile. Acting upon advice of the engineering department, the county surveyor made an examination of the character of the soil near the institution and it was found to be unsuitable for the disposal of sewage in the manner proposed. Looking toward the establishment of surface filters, the county surveyor made an examination of Jonathan Creek in the vicinity of the institution. It was found that it was impracticable to establish a plant north of the institution owing to the presence of a dam in the stream, which impounded a small reservoir for boating and bathing purposes. Below this dam and east of the institution it was found difficult to locate a plant owing to topographic conditions. The land near the stream in this locality is at times flooded, and it appears likely that a plant of the intermittent sand filter type would receive considerable damage during high stages of the stream.

Weighing the possibilities of the establishment of a sewage purification plant, it has been decided by the county surveyor that simple clarification of the sewage will be the only practicable method.

Proposed Plans. The plans of the county surveyor include the construction of a sewer from the institution to Jonathan Creek, having a total length of 2300 feet and constructed of 6-inch vitrified pipe. The sewer will terminate in a septic tank of concrete construction to be placed entirely underground at the edge of the stream. The tank is 9 feet by 9 feet in plan and has a depth to the flow line of 9 feet, giving it a capacity of 5450 gallons, representing approximately thirteen hours sewage flow on the basis of an ultimate daily flow of 3,000 gallons. The sewage enters the tank through an inverted elbow discharging 4 feet below the flow line, and leaves at the opposite side through an inverted elbow extending 2 feet below the flow line. It is intended to discharge the sludge at high stages of the stream through a 6-inch sludge drain connecting with the outlet pipe from the tank. This outlet pipe will be constructed of 6-inch cast iron pipe at its lower end and will be carried below the low water level of the stream. The design of the septic tank is poorly proportioned and should preferably be made narrower and of greater length to secure the same capacity.

Jonathan Creek has a watershed area above the point of outlet of about 190 miles, and according to the records of the U. S. Geological Survey has a dry weather flow of 20 cubic feet per second. It will therefore be seen that the flow will be ample at all times to dilute the sewage sufficiently to avoid nuisance. Jonathan Creek enters Moxahala Creek about one mile below the proposed outlet, and the latter stream follows a winding course to the Muskingum River, which it enters at the southerly limits of the city of Zanesville. No water supply is taken from either creek. The Muskingum River already receives the sewage from Zanesville without the production of a nuisance, and therefore the avoidance of a nuisance in Jonathan Creek and Moxahala Creek is a deciding factor in considering the disposal of sewage from the Muskingum County Children's Home.

ACTION OF THE BOARD.

At its meeting held April 11th, 1912, the State Board of Health approved the plans for a proposed sewer and sewage disposal for the Muskingum County Children's Home, submitted by Mr. W. V. Hollingsworth, county surveyor, on March 18th, 1912, subject to the following conditions:

1st. That the proposed septic tank be completed and ready for operation before sewage is discharged into the proposed sewer;

2nd. That the existing cesspool be cleaned, disinfected, and filled with earth or ashes, as soon as the proposed sewer is completed;

3rd. That secondary devices for more complete purification of the sewage be installed whenever deemed necessary by the State Board of Health;

4th. That the sludge from the septic tank be discharged only during high stages of the stream;

5th. That no additional connections to the proposed sewer outside the grounds of the institution be made without permission from the State Board of Health; and,

6th. That this approval be void unless construction shall have been begun prior to October 1st, 1912.

Mr. Hollingsworth was advised that the design of the septic tank should preferably provide a lesser width and greater length than that shown on the plans, and revised plans of the tank should be furnished the State Board of Health if this suggestion is followed.

REPORT ON PROPOSED ADDITIONAL SEWERAGE FOR NAPOLEON.

On August 9th, 1912, plans and specifications for proposed additional sewerage for Napoleon were received from Mr. Henry Kolbe, village engineer. On August 26th, 1912, the principal assistant engineer visited Napoleon and made an investigation of the existing sewerage conditions and the proposed improvement. The following report was submitted:

Napoleon, a village with a population of about 4,000 in 1910, is located in Henry County, on both sides of the Maumee River. The principal portion of the village lies on the northerly side of the river, while the district on the southerly side is devoted to residential purposes and has an estimated population of 800. This portion is known as South Napoleon and comprises the district for which the additional sewerage is proposed.

The public water supply of the village was installed in 1898. It is derived from the Maumee River, being drawn through an intake on the northerly side of the stream in the westerly portion of the village. The water supply is furnished to the consumers without treatment. It is used for domestic and drinking purposes, and on account of its unsatisfactory characteristics, many consumers have endeavored to improve it by the use of small household filters. There are, also, a number of private wells in use throughout the village. The quality of the water supply may be appreciated when it is considered that the watershed of the Maumee River above the intake has an area of 5,700 square miles and a population of about 100 per square mile, of which the urban population is about 50. Untreated sewage reaches the stream from a number of communities, the nearest of which is Defiance with a population of 7,500, sixteen miles above Napoleon. The principal cities upon the watershed and their populations are: Fort Wayne, Indiana, 65,000;

Lima, 30,000; Findlay, 15,000; Defiance, 7,500; Van Wert, 7,200; St. Marys, 5,700; Wapakoneta, 5,300; Delphos, 5,000; and Decatur, Indiana, 5,000. Although no definite information is available regarding the quality of the water supply, it is quite apparent that some method of purification should be installed.

Existing Sewerage. The first sewers of the village were installed twenty or more years ago. These sewers were originally storm water drains but became misused by connections for domestic sewage. Until recent years, the sewers discharged through three outlets located at the foot of Haly Avenue, a few hundred feet below the water works intake; at the foot of Perry Street into the Miami Canal; and into an open ditch discharging into the Maumee River 6,300 feet below the water works intake. On account of the nuisances created, the village in 1898 retained sanitary engineers to design a reconstruction of the sewerage system. At a meeting of the State Board of Health held October 12th, 1898, plans of The Riggs and Sherman Company of Toledo, consulting engineers for the village, were approved, provided the sewage should be purified in a manner satisfactory to the State Board of Health within three years from the date of approval. These plans contemplated the discharge of the entire flow of sewage into the Maumee River at a point 6,300 feet below the water works intake.

About 1900, the village proceeded to construct an intercepting sewer but did not follow strictly the plans of the consulting engineers. The interceptor, as installed, carries all of the flow from the sewers of the village to one outlet, excepting the lower portion of the Haly Avenue sewer, which at the present time discharges storm water and possibly small quantities of sewage into the river. Although included in the plans of the consulting engineers no sewers were installed in South Napoleon.

In 1906, it was proposed to install a system of sewers in South Napoleon according to plans of which those submitted August 9th, 1912, are essentially duplicates. Subsequent to an inspection by the engineering department, the village was informed that action would be deferred until opportunity was presented for determining the possibility of the contamination of the water supply of Napoleon by the sewage discharged from the proposed outlet. Since 1906, however, no investigation has been made to determine this possibility.

At the present time, therefore, that portion of the village of Napoleon north of the Maumee River is provided with combined sewers discharging through an outlet located some 6,300 feet below the water works intake. The discharge of sewage amounts to several hundred thousand gallons per day. The sewage creates no nuisance in the stream and has caused no complaint. A short portion of the Haly Avenue sewer receives a small quantity, if any, of domestic sewage, but its close proximity to the water works intake makes it a menace to the supply.

In that portion of the village south of the river no sewers have been installed.

Proposed Additional Sewerage. The plans of the village engineer provide for the installation of a combined system of sewers in South Napoleon covering practically the entire area of the district and having a total length of $6\frac{1}{4}$ miles. The trunk sewer, which has a total length of about one mile, ranges in size from 20 to 42 inches and terminates in a storm water overflow at the mouth of a small creek 4,200 feet below the water works intake. From this overflow the dry weather flow will be carried through a 24-inch sewer about 1,000 feet farther down stream where it will be discharged through a 14-inch cast iron pipe submerged $2\frac{1}{2}$ feet below the low water elevation of the river. This sewer to intercept the dry weather flow will be constructed along the steep bank of the river, and at no point along its course is a site suitable for a sewage purification plant. Furthermore, it is probable that no available location on the south side of the river can be found.

The proposed sewerage system will serve a district with a population of 800, all of which may ultimately become tributary. For a number of years it is probable that the dry weather flow will not exceed 80,000 gallons per day. The effect of this discharge of sewage upon the river will not be apparent and will cause no nuisance.

With regard to the effect upon the water supply of Napoleon it should be noted that the outlets of the dry weather flow, and of the storm flow are located about 5,200 feet and 4,200 feet, respectively, below the intake. These are respectively, 1,000 feet and 2,000 feet nearer the intake than the existing outlet of the present sewers of the village. In 1906, the Board withheld the approval of the proposed sewer on account of the possibility of contamination of the water supply during periods of low flow in the river and high wind velocity in the south-westerly direction. It would appear that the dry weather flow at least from the proposed system should be carried to a point opposite the existing outlet, or approximately 1,000 feet below the proposed location. Aside from the possibility of polluting the water supply, the proposed location has no objectionable features as it is well removed from habitations.

Maumee River. The Maumee River, which at present furnishes the water supply and receives the sewage of Napoleon, has a watershed above the village of 5,700 square miles. The average daily flow at Napoleon, based upon gagings at Waterville in 1899-1900, is approximately 165 cubic feet per second. The extreme dry weather flow at Napoleon is influenced largely by the location of dams in the river. Four miles below Defiance and twelve miles above Napoleon, a dam impounds the water for canal purposes and during extreme low flow the dam diverts practically the entire flow of the river. A dam fifteen miles below Napoleon also serves as a canal feeder and the back water extends three miles above Napoleon.

It is, therefore, apparent that in times of extreme low flow the velocity at Napoleon is negligible and the surface currents may be influenced by wind. It is at such times that the water supply may suffer contamination from sewage discharged below the intake.

Below Napoleon the Maumee River flows in a general north-easterly direction forty-two miles, emptying into Lake Erie at Toledo. The water supply of Toledo is taken from the river thirty-seven miles below Napoleon.

SUMMARY.

From the foregoing report it will be noted that the village of Napoleon is provided with a system of combined sewers which serve the district lying north of the river and discharge at a point in the extreme easterly portion, some 6,300 feet below the waterworks intake. The proposed additional sewerage will provide conveniences for the district south of the river and the proposed outlet is located about 1,000 feet upstream from the existing outlet. It would be advisable to carry this outlet to a point opposite the existing outlet with a view to preventing influence upon the water supply.

At the present time sewage from Napoleon may be discharged into the Maumee River without nuisance and without detriment to the quality of the river water provided the latter be purified before it is used for water supply purposes.

With regard to the water supply of Napoleon it is undoubtedly of unsatisfactory quality, and regardless of the possibility of pollution from the sewage of the village itself, the supply should be improved in quality by the installation of a purification plant.

ACTION OF THE BOARD.

At a meeting held September 12th, 1912, the State Board of Health approved the plans and specifications for proposed additional sewerage for Napoleon, submitted by Mr. Henry Kolbe, village engineer, on August 9th, 1912, subject to the following conditions:

1st. That the outlet for the dry weather flow be located at a point opposite the existing outlet, approximately 1,000 feet below the proposed location;*

2nd. That the village have a complete examination immediately made of that portion of the Haly Avenue sewer discharging into the Maumee River a few hundred feet below the water works intake, with a view of locating all connections to the sewer used for sanitary purposes; and that the village council by ordinance provide for the immediate abandonment of all such connections;

3rd. That the sewage from the entire village be purified in a manner satisfactory to the State Board of Health when deemed necessary by said Board; and,

* These plans were examined by the engineering department and found satisfactory. The first and fourth conditions of the approval of September 12th, 1912, were fulfilled.

4th. That this approval shall be void unless plans providing for an extension of the outlet be submitted prior to January 1st, 1913,* and the proposed system installed prior to January 1st, 1914.

The authorities were informed (1) That it is possible that the discharge of sewage at Napoleon may influence the quality of the water supply of the village during certain meteorological conditions; (2) that even if this effect were not apparent the water supply is obtained from a stream polluted by sewage received from several communities above Napoleon; and, (3) that inasmuch as it is probable that the Maumee River will continue to receive untreated sewage in an increasing amount for a number of years, it is of the utmost importance that steps be taken to improve the quality of the water supply by the installation of a purification plant.

They were also requested to have a representative of the village of Napoleon present at the next regular meeting of the State Board of Health, October 23rd, 1912, to state what steps would be taken to improve the water supply.

November 21st, 1912, Mr. George A. Meekison, village solicitor, presented revised plans for proposed sewerage for South Napoleon.

REPORT ON PROPOSED SEWERAGE AND SEWAGE PURIFICATION FOR NEW BERLIN.

On February 12th and 21st, 1912, plans and profiles for proposed sanitary sewers and sewage purification works for New Berlin were received from Mr. J. H. Holl of Canton, civil engineer for the village. On March 5th, 1912, revised plans for sewage purification works were submitted. On October 4th, 1911, in anticipation of the preparation of the plans the assistant engineer visited New Berlin and inspected sites proposed for the location of the purification works. After a study of the plans the following report was submitted:

New Berlin, a village with a population of 865 in 1910, is located in Stark County, about six miles north of the city of Canton. The village is at present experiencing a flourishing growth, the population having doubled during the last decade. Several manufacturing establishments have been located within the village, including a large harness factory employing 350 men, a distillery, and several other smaller industries. Owing to the favorable location of the village as a suburb of Canton, the likelihood of its future development is promising. The built up portion of the village is upon fairly level ground and drainage takes place partly to the east to the west branch of Nimishillen Creek, and partly to the west to a small tributary of that stream. The map of the village presents a somewhat unusual arrangement and shows five principal streets diverging

from the center of the community. These streets have each become built up to a distance of about 2,500 feet from the central portion of the village.

At the present time there are no municipal improvements, although a bond issue has been recently passed to provide for the installation of a public water supply and a complete system of sanitary sewers with sewage purification. Briefly, the plans of the village engineer provide for the construction of sanitary sewers covering practically the built up portion of the village, and sewage purification works situated immediately west of the village.

PROPOSED SEWERAGE.

In designing the sewerage system, difficulty has been encountered in collecting the drainage from all portions of the village to one outlet. Owing to the topography, the eastern portion of the village drains to the west branch of Nimishillen Creek, although the main portion of the village drains in a westerly direction to a small branch of that stream. By placing certain portions of the system at a depth of about 18 feet, it has been possible to extend the sewers to almost all of the eastern portion, although a small area which at present is sparsely built up, in the south-eastern portion of the village, is not tributary to the sewers. Should sewers be provided for this portion of the village in the future, it would be necessary that provision be made for pumping, or that an auxiliary purification plant be constructed.

The sewers as designed comprise a total length of 14,250 feet, while the outfall sewer at the disposal plant is 1,610 feet in length. The sewers will consist of the following sizes and lengths:

8-inch vitrified pipe.....	8060 feet
10-inch vitrified pipe.....	3430 "
12-inch vitrified pipe.....	1060 "
15-inch vitrified pipe.....	1700 "

It will be noted that the relative proportions of the different sizes of the pipe are well chosen. Thirty-seven manholes on the sewerage system and four manholes on the outfall sewer are provided for the system, located at changes of grade and direction. On the whole the sewerage system is well designed, and the grades are sufficient to furnish a velocity of flow to provide for the freshness of the sewage as it is received at the purification works.

PROPOSED PURIFICATION WORKS.

The design of the purification works provides for a screen chamber, two sedimentation tanks, a sludge filter, a dosing tank, and intermittent sand filters. The effluent will be discharged into a small run which passes the site. The plant is designed for a sewage flow of 60,000 gallons per day and a population tributary of 800.

Site. The location selected for sewage purification works is a tract of ground having an area of two and one-half acres, located immediately west of the westerly corporation line of the village and immediately north of Massillon Street extended. At the present time the nearest dwelling is 1,250 feet in an easterly direction from the limits of the city, and only a few dwellings are within a radius of 1,500 feet. Furthermore, the likelihood of future building development within a radius of 1,000 feet is slight. Massillon Street, which extends to a point about 500 feet from the plant, offers the only opportunity for the location of dwellings within a zone where odors might be complained of, but owing to the topography it seems unlikely that building operations in this vicinity will be active. The site itself is situated in the valley of a small stream which drains the westerly portion of the village. The course of this stream will necessarily be diverted to provide for the construction of the plant, but by suitable dikes the danger of flooding may be obviated. On the whole the site selected is favorable for the location of purification works of the type selected, and with sufficient care the operation of a plant on the site should cause no complaint.

Screen Chamber. The 15-inch main outfall sewer will discharge sewage through a screen chamber before its entrance into the sedimentation tanks. The screen chamber is of concrete construction, 9 feet in length by 4 feet in width, with its bottom sloping from a depth of 2 feet 8 inches at the inlet to a depth of 4 feet 4 inches at the outlet. Two screens inclined at 45 degrees are provided. The screens are to be constructed of $\frac{1}{2}$ -inch by 2-inch wrought iron bars, and the first screen will have openings of one inch in width, while the second screen will have openings of three-fourths of an inch. Two 10-inch outlets from the screen chamber to the sedimentation tanks are provided. These outlets are fitted with gate valves by means of which the sedimentation tanks may be thrown out of service.

Sedimentation Tanks. The sedimentation tanks, of which two are provided, are constructed of concrete and are uncovered. They are each 44 feet in length by 11 feet in width and have an average depth of $6\frac{1}{2}$ feet to the flow line. The capacity, therefore, is 23,000 gallons each. On the basis of a sewage flow of 60,000 gallons per day, this provides a retention of 17.3 hours if both tanks are in service, and 8.6 hours when only one is in service. Hanging wooden baffles are provided at the inlet and outlet end, placed 24 inches from the end walls of the tanks. These baffles extend to a depth of 3 feet below the flow line and should be efficient in distributing the flow through the tanks. The settled sewage leaves the tanks over 4-foot weirs and enters the dosing tank. Facilities for cleaning the tanks are provided by 10-inch drains leading from a point 10 feet and 12 feet from the inlet end of the tanks, respectively, to which the floor is sloped. The sludge drain leads to a sludge filter.

Sludge Filter. To receive the accumulated solids removed from the

sedimentation tanks, a sludge filter 30 feet by 100 feet, or 3,000 feet in area, is provided. The filtering material will consist of 2 feet of sand of the same quality as that used in the intermittent sand filters. A single line of 6-inch underdrains will provide for the removal of the filtrate. The sludge is applied at the surface through 10-inch pipes discharging at the edge of the unit, with no provision for distribution. The embankments surrounding the sludge filter are carried to an elevation of about one foot above the sand surface. The flooding of the unit by the discharge of one compartment of the sedimentation tanks, will flood the sludge unit to a depth of about one foot.

Dosing Tank. The settled sewage from the sedimentation tanks is collected in a dosing tank and intermittently discharged upon the filter units. The dosing tank is of concrete and is uncovered. It is 23 feet by 27 feet in plan and 4.4 feet deep to the flow line, and has a capacity, therefore, of 20,000 gallons. This dose will flood the filter units to a depth of 3 inches, which is satisfactory. To provide for successful application of the sewage to the various units, three sequence siphons are provided, one for each filter unit. To provide for future development, space is provided for a fourth sequence siphon. The type of this apparatus is not designated and should be subject to the approval of the engineer of the Board.

Sand Filters. The intermittent sand filters provided consist of three units of $\frac{1}{4}$ acre each, 120 feet by 90 feet in plan. The units are separated and surrounded by earth embankments, which extend 2 feet above the sand surface. The filtering material will consist of 3 feet of sand. The discharge from the dosing tank will be distributed by means of ten vitrified pipe laid with cemented joints, discharging at two points on each unit upon concrete slabs. The sand will rest upon gravel graded from fine at the line of intersection of sand and gravel to coarse immediately surrounding the underdrains. The effluent so collected by five lines of underdrains from each filter, discharges into a 12-inch main drain which enters a small stream that passes the plant.

Disposal of Effluent. The discharge of the sand filter effluent and the sludge filter effluent will create no objectionable conditions in the small stream if reasonable attention is given to the operation of the plant. The stream is used to but a slight extent for cattle watering purposes below the point of outlet and enters Nimishillen Creek, a stream with a perennial flow, about 1,400 feet below the plant. The public water supply wells of Canton are located in the valley of the west branch of Nimishillen Creek, obtaining their supply from gravel deposits. Occasionally in the past the water from the creek has also been used to supplement the supply. At the present time the city of Canton is taking steps to secure an additional ground water supply, and if this is done the creek intake should be abandoned. It is not likely that the existing wells will be affected by the discharge of the effluent from the proposed sewage purification works at New Berlin.

ACTION OF THE BOARD.

At a meeting held March 21st, 1912, the State Board of Health approved the plans and profiles for proposed sanitary sewers received February 12th and 21st, 1912, and the revised plans for sewage purification works received March 5th, 1912, prepared by Mr. John H. Holl, civil engineer, of Canton, for the village of New Berlin, upon the following conditions:

1st. That the sewage purification works be completed before any connections to the proposed sanitary sewers are made;

2nd. That the sewage purification works be enlarged, altered, or repaired, when in the opinion of the State Board of Health such shall become necessary;

3rd. That samples of the filtering material be submitted to and receive the approval of the engineer of the State Board of Health;

4th. That detailed plans of the automatic dosing apparatus be submitted to the State Board of Health;

5th. That the village council appoint a superintendent of sewers who shall attend to the operation of the sewage purification works and have general supervision of the sewerage system; said superintendent to receive general instructions as to his duties from the State Board of Health; and,

6th. That this approval be void unless construction of the sewers and sewage purification works shall have been commenced prior to August 1st, 1912.

On October 10th, 1912, a communication was received from Mr. C. G. Herbruck of Canton, solicitor for the village of New Berlin, requesting that the Board extend the time limit of its approval. The request included the statement that the legislation for the sale of bonds had been delayed, and that an additional appropriation had been necessary for the purchase of a site for the plant. It appeared that the construction of the plant could not be begun before the spring of 1913.

The work on the construction of the sewers had not progressed very far, and it was probable that even if the construction of the sewage treatment works were begun before the spring of 1913, it would not be necessary to discharge raw sewage at the outlet.

ACTION OF THE BOARD.

At a meeting held October 23rd, 1912, the State Board of Health considered this request, and granted an extension of time, revising the sixth condition of its approval of March 21st, 1912, to read "That this approval shall be void unless construction of the sewers and sewage purification works shall have been commenced prior to June 1st, 1913."

REPORT ON PROPOSED SEWERAGE AND SEWAGE PURIFICATION FOR NEW LONDON.

On June 10th, 1912, a plan of proposed sanitary and storm sewers for New London was received from the W. J. Sherman Company of Toledo, consulting engineers, for the village. Based on knowledge of the local conditions obtained during various visits of representatives of the engineering department and an examination of the plan submitted, the following report was prepared:

At a meeting held June 19th, 1912, the State Board of Health considered the plan for sanitary sewers for New London, submitted by the W. J. Sherman Company, consulting engineers, on June 10th, 1912; and voted to withhold approval of this plan, and to notify the authorities and their consulting engineers that while the plan for sanitary sewers was in general satisfactory, the Board would require that plans for a sewage purification plant satisfactory to the State Board of Health, be submitted before approval of the sewers was given.

Complying with this requirement, plans for a sewage purification plant for New London were submitted by the consulting engineers on July 17th, 1912. These plans were referred to the engineering department and one of the assistant engineers visited New London on August 2nd, 1912, for the purpose of inspecting the site for the plant. Following this visit the plans were reviewed and a communication was addressed to the W. J. Sherman Company criticizing the plans and further stating that these plans were not suitable to present to the Board for action. Accordingly, on August 10th, 1912, a revised set of plans was received which was referred to the engineering department, and the following report was submitted:

New London is a village with a population of 1,557 in 1910, located in Huron County at the headwaters of the watershed of the Vermillion River. The topography of the village is mildly undulating and drainage reaches Bonnie and Skellenger Creeks, which flow through the easterly and westerly portions of the village, respectively. Both of these streams enter the east branch of the Vermillion River a few miles north of the village. The geological formations consist of the Cuyahoga shale which is covered with drift deposits of glacial origin. The village is one without manufacturing industries producing a liquid waste and therefore the sewage will be entirely of domestic origin.

At the present time the village is not provided with a public water supply, although one has been contemplated for several years. At the present time investigations are under way to locate a suitable ground water supply. The village has a number of paved streets, which fact increases somewhat the difficulty in the installation of sewers. In the absence of a public water supply, the private wells are depended upon and these are usually shallow dug wells furnishing a water of unsatisfac-

tory quality from a sanitary standpoint. Up to the present time no sanitary sewers have been installed.

PROPOSED SEWERAGE.

The plan of the consulting engineers provides for a comprehensive system of sanitary sewers, but does not include a design for sewage purification works. The sewers are laid out in two systems, separated by a line passing through the village in a northwesterly and southeasterly direction. The main outfall sewers from the two systems are conveyed to a common point to outlets into Skellenger Creek in the extreme northwesterly portion of the village.

The design of the sewerage system provides for the ultimate installation of about 10 miles of sanitary sewers and 2.3 miles of storm sewers. The sanitary sewers will consist of the following sizes of vitrified pipe:

6-in.	6,165 feet
8 "	36,885 "
10 "	8,115 "
12 "	2,980 "

It will be noted that approximately 11 per cent of the system will be of 6-inch pipe, but this is placed on short dead ends from which no extensions will be made in the future. Although the 6-inch pipe is smaller than is considered good practice, it is permissible under the conditions of the design. Of the total length of sewers designed, only a small portion will be constructed in the near future but will be placed in accordance with the comprehensive plan. In general it may be stated that the sewer system is well designed and provided with adequate grades to secure self-cleansing velocities.

Skellenger Creek, into which it is proposed to discharge the sewage for several years at least without treatment, is a stream with a watershed area above the proposed outlet of about 1.9 square miles and has a low dry weather flow. The stream is entirely too small to provide sufficient dilution for the sewage of the village to avoid the production of a nuisance, and with the use of the sanitary sewers purification will be required.

PROPOSED SEWAGE PURIFICATION PLANT.

Site. The site proposed for the location of the plant is in the extreme northwestern part of the village, along Skellenger Creek. The stream, which at present flows through the site, will be straightened to flow along the western edge of the plant. The site is rather poorly located from the standpoint of the proximity of habitations. North Main Street, about 700 feet east of the site, is now considerably built up directly opposite the plant. There are also several houses on Hooker Court about 800 feet south of the site. Furthermore, the district between the site and

these two streets is an excellent one for building purposes and will probably be built up within a few years. It would be advisable to locate the plant just south of the north corporation line of the village and west of Skellenger Creek at a point about 500 feet north of the present site.

General Features of Plant. The plans for the plant in general include a pump well, two settling tanks, four sand filters and a sludge bed. Provision is made at either side of the filters for future extension to the filtering area. The sewage will flow by gravity to the plant through two lines of sewers and will then be pumped to the settling tanks. Near the plant a by-pass will be provided for discharging the sewage from both lines of sewers directly into the creek. The pump well and sludge bed will also be drained at this point.

Pump Well. On account of the topography it will be necessary to pump the sewage, the pump house being located at the plant. This building consists of a brick superstructure 10 feet by 16 feet 8 inches in plan, inside dimensions, placed over a reinforced concrete pump well about 32 feet deep. Attached to the latter is a reinforced concrete screen well, containing a basket screen. The latter is placed just below the end of the sewer. This screen, the details of which are not shown, is about 3 feet by 3 feet in plan by 3 feet deep, and may be raised and lowered by means of a hand operated windlass, placed above the surface of the ground. The sewage will be raised about 37 feet to the inlet trough of the settling tanks by means of a submerged centrifugal pump placed in the bottom of the pump well and gear driven by a five horse power motor placed on the floor above. The pumping machinery, which will be installed in duplicate, will be placed in a dry well constructed by means of a reinforced concrete wall about 27 feet deep, extending across the well. Near the top of the pump well a 15-inch overflow pipe is provided. Valves should be provided in the suction line to the pumps in order to cut off the flow to the pumps when necessary. Each of the pumps will have a 4-inch suction, a 6-inch discharge pipe, and a capacity of 250 gallons per minute. An automatic electric starter is provided by means of which the pump will be started whenever the sewage reaches an elevation in the pump well which is about 12 feet above the bottom.

Settling Tanks. The two settling tanks are separated by means of a longitudinal center wall, into compartments each 70 feet long. One compartment is 15 feet wide and the other 10 feet wide. The depth of the sewage in the tanks varies from 5.65 feet to 8.30 feet, as the bottom slopes from near the center and from both ends to two convenient points where 12-inch sluice gates are provided. The tanks have capacities of 36,600 and 54,900 gallons, respectively, or a combined capacity of 91,500 gallons. Based on an ultimate population of 3,000 and an ultimate sewage flow of 225,000 gallons per day, for which the sewerage system is designed, the tanks will have periods of flow of 3.9 hours and 5.85 hours, respectively, or a combined period of flow of 9.75 hours. The sewage

enters the tanks through 4-inch circular openings placed one foot apart across the width of the tanks at an elevation about 2 feet below the flow line. Near the middle of the tanks a baffle extends from the floor to a point 2.65 feet below the flow line. On either side of this baffle is a hanging baffle extending 2.5 feet below the flow line. These baffles are provided to act merely as tie beams for the side walls and will not materially affect the operation of the tanks. Two hanging baffles are provided one foot from the inlet and outlet of the tanks, respectively. Both of these baffles are somewhat closer to the ends of the tanks than desirable, and the one at the inlet is slightly deeper than necessary. With these exceptions the settling tanks are well designed and should give satisfactory results.

Sludge Filter. The sludge filter is 173 feet by 46 feet in plan with an effective area of 7200 square feet or 0.165 acre. The sewage from the larger settling tank will cover this bed to a depth of about one foot. The filtering material in the sludge bed will consist of 2 feet of coarse sand, underlaid with gravel similar to that in the sand bed. The underdrains will be constructed of 6-inch vitrified pipe, laid loosely in rows 11 feet apart. As designed the sludge bed should operate satisfactorily.

Dosing Chamber. The sewage will be carried from the settling tanks to the control house, located in the center of the four filter beds, by means of a concrete channel. The dosing chamber, which will be constructed of reinforced concrete, will be 32 feet by 16 feet in plan by 14 feet deep to the flow line, with a capacity of about 15,300 gallons. This dose will flood any one of the filters to a depth of about $2\frac{1}{4}$ inches. Four 10-inch automatic siphons will be installed, the make of which will be determined later. The plans for this apparatus should be submitted to the chief engineer of the State Board of Health for approval.

Sand Filters. For the present installation there will be four filter beds, each having about 0.25 acre effective area or a total filtering area of one acre. This area will probably be adequate for a number of years though the village should be required to construct additional filtering area as soon as such becomes necessary. Provision is made on the plans for eight additional filter beds, comprising a total area of two acres, for future extension.

The filtering material will consist of 30 inches of coarse sand, underlaid with washed gravel or crushed stone $\frac{1}{8}$ inch to $\frac{1}{2}$ inch in size. This will have a minimum depth of 3 inches on the ridges. The underdrains will be covered with washed gravel or crushed stone $1\frac{1}{2}$ inches in size. The sewage will be distributed on to the beds by means of galvanized iron carriers. These will consist of a main carrier extending diagonally the length of the bed, with branch carriers reaching to all parts of the bed. An even distribution of the sewage should thus be afforded. The underdrains consist of 6-inch vitrified pipe placed in rows about 17 feet apart. The bottoms of the bed will be sloped to form ridges and valleys.

Outlet. The effluent from the filters will be discharged into Skellenger Creek at an elevation which is two feet above the present creek bottom. A flap valve should be placed on the end of the outlet pipe in order to prevent the creek water from backing up into the filters during flood stages of the creek.

SUMMARY.

In conclusion it may be stated that:

(1) The proposed site for the sewage purification plant for New London is rather poorly located with respect to present and probable future habitations. A more suitable location can probably be found about 500 feet north of the present site and west of Skellenger Creek.

(2) A valve or shear gate should be provided in the dividing wall of the pump well for cutting off the sewage flow to the dry well.

(3) The baffles in the settling tank are somewhat closer to the end walls than desirable.

(4) A flap valve should be provided at the end of the effluent pipe from the filters in order to prevent the creek water from backing up into the filter beds during times of high water.

(5) It should be required that detailed plans of the dosing apparatus be submitted for the approval of the chief engineer of the State Board of Health, before being installed.

(6) The local officials should be required to pass an ordinance prohibiting connections to any sewer for sanitary purposes until the plant is installed.

ACTION OF THE BOARD.

At a meeting held August 15th, 1912, the State Board of Health approved the plans for a proposed system of sanitary sewers and a sewage purification plant for New London, submitted by The W. J. Sherman Company of Toledo, consulting engineers for the village, on August 10th, 1912, subject to the following conditions:

1st. That approval of the proposed location for the sewage purification plant be held in abeyance pending the proposal of the village to begin construction;

2nd. That the sewage purification plant be constructed in accordance with the plans, before connections to the sewers are made;

3rd. That before connections to the sewers are permitted, the village council pass an ordinance, satisfactory to the Secretary of the State Board of Health, which will regulate the use of the sewers;

4th. That samples of all filtering material be submitted to and approved by the Engineer of the State Board of Health before being placed;

5th. That detailed plans of the automatic dosing apparatus be submitted to the State Board of Health before being installed;

6th. That the village appoint a competent operator, satisfactory to the State Board of Health, to have general supervision of the sewerage system and purification plant; and

7th. That this approval be considered void unless the proposed sewers and sewage purification plant shall have been constructed prior to January 1st, 1912.

REPORT ON PROPOSED SEWERAGE FOR OAK HARBOR.

On December 7th, 1911, preliminary plans for proposed sanitary sewers for Oak Harbor were received from Mr. George Champe, consulting engineer for the village. On December 2nd, one of the engineering assistants visited Oak Harbor for the purpose of inspecting the contemplated improvement and the proposed outlet. The following report was submitted:

Oak Harbor, a village with a population of 1,559, is located in Ottawa County on the Portage River about twelve miles above its mouth. The village is essentially a farming community and contains no industries aside from a brick and tile plant and a few other small establishments. It is supplied with a public water supply installed during the summer of 1911. The topography within the village is very flat, the drainage taking place in the southerly direction to the Portage River, which forms the southern boundary of the village. The geological formations consist of soil and clay to a depth of 22 feet, which is underlaid with limestone.

The present sewerage consists of three storm sewers which discharge into Portage River. These storm sewers have been misused to some extent and receive drainage from dwellings and cesspool overflows. At the outlets, which are poorly located, decided nuisances are caused by the misuse of the storm sewers.

Since the installation of the public water supply there is occurring a more general use of modern plumbing conveniences which demand better sewerage facilities. The project is still in a preliminary state and no bond issue has as yet been provided for the purpose.

Proposed Sewerage. The preliminary plans of the consulting engineer, showing the location of the proposed sewers, contemplate the installation of sewers in all the built up portions of the village. The total length is 8.1 miles consisting of the following sizes of pipe:

6-inch	28,586 feet
8-inch	10,098 "
10-inch	4,029 "

The sewers are to be constructed entirely of vitrified pipe, but the details including the location of manholes and flush tanks, grades and method of ventilation of the sewers, etc., have not as yet been worked out. The rather high percentage of 6-inch pipe should be noted and it may be stated that this is not in line with the best engineering practice.

The outlet from the system is to be a 10-inch main sewer entering the Portage River a short distance southeast of the village. It is not contemplated at present to construct sewage purification works and it is proposed to dispose of the sewage by dilution. As no figures on the water supply consumption are available, it is difficult to furnish well-founded estimates on the probable sewage flow. On the basis of 100 gallons per

capita, with an ultimate population tributary of 2,000, the ultimate sewage flow will be 200,000 gallons per day. For a number of years, however, this figure will not be reached.

Assuming that the discharge of untreated sewage into Portage River is satisfactory, the consulting engineer has selected an outlet to be located at a point about 500 feet east of the corporation line of the village. An inspection of this location showed it to be unsatisfactory due to low swampy land in the vicinity and the difficulty of carrying the outlet into the main portion of the stream to provide proper dispersion. At this point, moreover, the river has considerable width and its velocity is, therefore, slow. An inspection of the river below Oak Harbor indicated that a more suitable location for the outlet could be secured at a point about 1,000 feet below the proposed outlet where the stream becomes narrower and its velocity therefore greater. Moreover, at this location a site for purification works is available. The installation of such works will, however, require pumping.

The Portage River, into which it is proposed to discharge the untreated sewage, has a watershed area above Oak Harbor of 640 square miles. The stream receives the drainage and sewage from Bowling Green, Fostoria, North Baltimore, and Elmore. At ordinary stages of Lake Erie the stream consists of slack water to a point a short distance above Oak Harbor. This portion of the stream is widened considerably, has shallow flowage along its banks, and its velocity of flow is small. The elevation of the water in the river fluctuates with that of the lake, and at times the direction of flow is upstream. No stream gaging results are available to show the average flow of the river, although its watershed area would indicate the flow to be sufficient at all times to dilute the sewage from Oak Harbor sufficiently to avoid nuisance.

Below Oak Harbor the stream passes through flat swampy and uninhabited territory and enters the lake at Port Clinton. This village obtains its water supply through an intake located in Lake Erie about 1,600 feet from the shore and 1,000 feet west of the end of a Government breakwater pier which extends some 2,000 feet from the west side of the mouth of the river into the lake. Under ordinary conditions the river water is thus directed away from the intake, although at times the wind conditions create currents which carry the river water directly over the intake. Port Clinton also has an emergency intake drawing water directly from Portage River. It should be noted that Port Clinton discharges sewage into the Portage River through seven outlets. The quality of the water supply of Port Clinton previous to the introduction of a filter plant has been studied by numerous analyses made by the State Board of Health. These have demonstrated clearly that the public water supply is a mixture of lake and river water. It will be seen, therefore, that the question of the discharge of untreated sewage from Oak Harbor is influenced by the proximity of the water supply intake of Port Clinton.

During 1911 there was constructed a mechanical filter plant for the purification of the water supply of Port Clinton. This plant was installed to clarify the frequently turbid water from the lake, as well as to insure its sanitary quality. With efficient operation the plant should satisfactorily purify a mildly polluted water such as is obtained from the lake.

The influence of the discharge of untreated sewage, into the Portage River from Oak Harbor, upon the quality of the raw water at Port Clinton should be considered. There are several factors which indicate that this influence will not be serious. The dilution afforded by the stream flow will be large at all times and the very low velocity of the river will effect a natural purification before the discharge into the lake. Taking into consideration these facts it seems logical to assume that the pollution of the Portage River at Port Clinton will not be increased by the discharge of sewage from Oak Harbor.

At a meeting of the State Board of Health held December 20th, 1911, this report on the general plan for proposed sewerage for Oak Harbor was considered, and, on recommendation of Mr. Hill, the matter of proposed sewerage for Oak Harbor was referred to the engineering department for a report at the next meeting of the Board upon the possibility of installing some form of tank for the partial purification of the sewage.

On March 6th, 1912, revised preliminary plans for sanitary sewers and for a septic tank were received from the consulting engineer. After a review of the plans the following report was submitted:

The proposed sewerage system as shown on the revised plans submitted March 6th is essentially the same as that shown on the plans previously submitted and described in a previous report. It is the intention for the present to construct only the main trunk sewer and to delay the construction of laterals until a later date. This procedure is adopted in order to insure conformity to a comprehensive plan in the future construction of sewers.

The revised preliminary plans for sewerage provide for the establishment of an outlet a short distance southeast of the village on the north bank of the Portage River. The point selected in the revised plans is some 750 feet east and farther removed from the village than that shown on the plans previously submitted. The river at this point has a velocity sufficient to prevent stagnation of the sewage, provided the outlet is submerged a short distance from the bank. The point of outlet selected is as far removed in an easterly direction as is possible to obtain a sufficient grade in the sewer line.

The plans for the septic tank have not been completed as to details, and only a general sketch plan has been prepared. It is proposed by the village to build the trunk sewer with a temporary outlet into the Portage

River and omit the construction of the tank until a later date, when the sewage flow shall have increased sufficiently to warrant its installation. The design provided for a screen chamber and septic tank. The screen chamber is of concrete construction and covered, and is 6 feet by 4 feet in plan. One screen with $\frac{3}{8}$ -inch openings is provided. The septic tank is of concrete construction and is to be placed underground, provided with two manholes for inspection and cleaning. The roof will be arched and under two feet of cover. The tank is 35 feet in length by 12 feet in width, and has an average depth to the flow line of $6\frac{1}{2}$ feet. Its capacity, therefore, is 20,500 gallons. Hanging baffles are provided at the inlet and outlet ends to provide distribution of the flow. The floor of the tank is sloped to a point about 6 feet from the inlet end where the sludge is removed through the 6-inch cast iron pipe leading to a sludge well near the tank. This sludge well is circular in plan and 4 feet in diameter, and is to be provided with a sludge pump. The effluent from the tank will be conducted through a 10-inch pipe to a submerged outlet in the Portage River.

The septic tank is of such capacity as to provide a period of flow of 2.5 hours, based on an ultimate sewage flow of 200,000 gallons per day. This capacity is insufficient. It would be desirable to provide two units in order to secure better facility of operation for cleaning of the tanks. The method of disposing of the sludge is not shown and this would necessarily be provided for by the use of sludge filters.

The general considerations attending the question of the discharge of untreated sewage into the Portage River have been taken up in a previous report and will not be repeated here. In brief it may be stated that the Portage River is of sufficient dry weather flow to dilute the untreated sewage of Oak Harbor without producing a nuisance, and that the nearest water supply below, namely, Port Clinton, at the mouth of the river would not be endangered by such discharge considering the existence of a recently installed mechanical filter plant at that village.

SUMMARY.

From the foregoing report it will be noted that it is desired by the officials at Oak Harbor to install a main trunk sewer which will constitute a portion of a proposed comprehensive system of sanitary sewers.

While plans for a septic tank are included in the general preliminary plans, it is not proposed to construct this tank at this time, but to await the development of a necessity for it in the future. The design of the tank is not entirely satisfactory and a revised design will be required when the tank is installed. It therefore appears advisable to consider at the present time the proposed sewerage system, and to provide for the installation of complete or partial purification of the sewage when it shall become necessary in the future.

ACTION OF THE BOARD.

At a meeting held March 21st, 1912, the State Board of Health considered the general plan for proposed sewerage for Oak Harbor, submitted by Mr. George Champe, consulting engineer, on December 7th, 1911, providing for the establishment of a submerged temporary outlet into the Portage River some 2750 feet east of the Locust Street bridge, and the same was approved with the following conditions:

1st. That a purification plant of a design satisfactory to the State Board of Health be installed when in the opinion of said Board such becomes necessary;

2nd. That detailed plans of the sewerage system, including manholes, flush tanks, grades, sizes, and method of ventilation of the sewers; and location and construction of the outlet, be submitted to and receive the approval of the State Board of Health;

3rd. That there be appointed a sewer superintendent whose duty it shall be to keep accurate records of the sewer extensions and all connections to the sewers; and,

4th. That this approval be void unless detailed plans of the sewerage system shall have been submitted prior to August 1st, 1912, and construction shall have been begun prior to January 1st, 1913.

REPORT ON SEWERAGE CONDITIONS AT PORT CLINTON.

On September 20th, and October 5th, 1911, communications were received from Mr. E. H. Fishack of Port Clinton, complaining of objectionable conditions caused by the discharge of sewage from the village into Lake Erie. On December 1st, 1911, an inspection was made by one of the engineering assistants. The following report was submitted:

Port Clinton is located in Ottawa County on the shore of Lake Erie at the mouth of the Portage River. The population is about 3,000 and the village is essentially of residential character. In municipal improvements, the village has a public water supply, a rather complete system of combined sewers, and a number of miles of paved streets. The water supply is taken from Lake Erie at a point 1600 feet from the shore, and 1000 feet west of a breakwater pier extending from the mouth of the Portage River into the lake.

Present Sewerage. Removal of storm water, as well as domestic wastes, is afforded by several miles of combined sewers. These sewers have been constructed at various times and in no case has the State Board of Health been requested to give approval of the proposed sewers. The outlets are located along the Portage River and the shore of the lake. Six or seven outlets discharge into the Portage River and these are all submerged below the mean level of the stream. The lake outlets are two in number and are located to the east of the mouth of the Portage River. The discharge of sewage into the Portage River is attended by no nuisance as the submergence of the outlets provides for a good dis-

tribution of the sewage through the flow of the stream. There is also provided a very high dilution which prevents putrefaction. The location of these outlets, however, has a sanitary significance in the fact that the water supply is drawn from the lake a relatively short distance from the mouth of the river. Under certain wind conditions the quality of the supply is greatly deteriorated and the purification works are heavily burdened.

The outlets into Lake Erie have given rise to considerable complaint, principally from residences in the vicinity of the outlets. The Fulton Street sewer, which has been the cause of the greatest nuisance, consists of a 24-inch vitrified pipe sewer. The lower end of the sewer is laid on the surface across low marshy land bordering the lake and the outlet is at the mean level. The lake at this point is very shallow and at low stage the sewage is discharged upon the surface, giving rise to objectionable conditions. The lake bottom has been rapidly silted up since the construction of the breakwaters at the mouth of the Portage River and contains considerable vegetation which tends to prevent the proper dispersion of the sewage discharged. Under normal conditions in the lake, therefore, a nuisance is created by the sewage from the Fulton Street sewer. An inspection at the outlet on December 1st, 1911, showed that a large quantity of sewage sludge had accumulated within a radius of 15 feet from the outlet. As the depth of the lake is not over 8 inches at this point, and as there are no currents, it will readily be seen that the conditions are such as to promote a nuisance.

At the other lake outlet, namely, the Shore Street outlet, conditions were found to be somewhat better, owing to the greater depth of the lake and better dilution at this point. The possibilities for the creation of a nuisance are, however, apparent and this outlet at times may give rise to complaint.

It will be seen that the present sewerage conditions have been reached without the knowledge or approval of the State Board of Health and it is evidently necessary that improvements be made. It would appear that inasmuch as the village has neglected to submit to the State Board of Health plans for proposed sewers which have been constructed at various times, the Board has the right to demand that certain conditions be met before approval of the existing sewers is given. It is obviously necessary that the sewage be collected at a suitable point and there purified, or properly disposed of into the lake by dilution. This should be done to abate the nuisance caused by the two lake outlets, and to remove contamination from the water supply by the river outlets.

ACTION OF THE BOARD.

At a meeting held January 17th, 1912, the State Board of Health considered the report of its engineer upon a recent investigation of sewerage conditions at Port Clinton.

It was found that several miles of combined sewers, with outlets into the Portage River and the shore of Lake Erie, had been constructed at various times without the approval of the State Board of Health, and that in order to abate the nuisance caused by the two lake outlets, and to avoid contamination of the water supply by the river outlets, the sewage should be collected at a suitable point and there purified, or disposed of into the lake by dilution.

The Board voted to require the village to retain the services of a competent sanitary engineer to study their sewerage problem with a view to improving present conditions, and submit plans for such improvements not later than July 1st, 1912.

REPORT ON PROPOSED SEWERAGE AND SEWAGE PURIFICATION FOR THE STATE SERUM INSTITUTE. NEAR REYNOLDSBURG.

On July 5th, 1912, plans and specifications for a proposed sewerage system and sewage purification plant for the State Serum Institute, near Reynoldsburg, were submitted by Mr. A. Elliott Kimberly, of Columbus, consulting engineer for the Ohio State Board of Agriculture. Following the receipt of the plans, the principal assistant engineer visited the institute on July 6th, 1912, for the purpose of making an examination on the ground. The following report was submitted:

The Ohio State Board of Agriculture has under construction a serum institute for the study of animal diseases. The principal work of the institute will be devoted to the study of hog cholera and the production of immunizing serum for distribution throughout the state. The institute is located in the eastern portion of Franklin County on the national pike about two and one-half miles east of Reynoldsburg, and consists of a laboratory building, three cottages, a pump and electric station, hyperimmune pens, manure bins, test pens, infection yard, crematory, farm barn, storage barn, and piggery. It is estimated that 1,000 hogs will be kept at the institute, from 200 to 300 of which will be infected hogs undergoing treatment for the production of serum. The population at the institute will be about 20 persons, while the ultimate maximum population is estimated not to exceed 40.

The water supply for the institute is derived from a driven well and will be piped to all of the buildings, pressure being afforded by means of an air pressure tank. The use of modern plumbing fixtures in a number of the buildings and the liquid wastes resulting from the operation of the institute require the installation of a sewage purification plant which will have a rather high bacterial efficiency. The plans for the proposed purification plant contemplate the use of disinfecting tanks, screen chamber, settling tank, dosing tank, and two sand filters.

Owing to the highly infectious character of the liquid wastes from the laboratory, at times from the hyperimmune pens, test pens and infection yard, the wastes from these sources will be carried by separate sewer lines and conducted to a battery of disinfecting tanks. After complete disinfection, the sewage will be discharged into the domestic sewer system and passed through the purification plant.

The sewage purification plant will be located at the edge of a small grove 1600 feet southwest of the institute and 1900 feet south of the national pike. The site is well selected with respect to proximity to habitations and should not prove objectionable from the standpoint of odors.

SEWAGE SYSTEM.

As shown on the plans, two separate systems of sanitary sewers will be provided; one for carrying domestic sewage, and the other for liquid wastes incident to the production of serum and the treating of sick hogs. The sewers will consist of 4-inch and 6-inch first quality vitrified sewer pipe in 3-foot lengths, to be laid with joints made of "jointite" to exclude ground water and prevent leachings from the sewers. Manholes will be provided at all intersections and changes of grade.

DISINFECTING TANKS.

In view of the highly infectious character of a large percentage of the liquid wastes from the institute, a battery of four disinfecting tanks will be provided for the purpose of disinfecting the wastes, thus relieving the burden which would otherwise be placed on the purification plant and insuring the destruction of infectious matter. The wastes which will be disinfected will be the drainage from the test pens, infection yard, laboratory, and hyperimmunizing pens. Separate lines of sewers will conduct the wastes from these sources to the four disinfecting tanks combined in a single concrete structure, 11 feet by 42½ feet in plan and 3 feet in depth to the flow line. The combined capacity of the tanks is 9,000 gallons, thus giving a period of flow of three days based on a daily flow of 3,000 gallons of infectious wastes. The wastes will enter the tank through an influent channel which extends the entire length of the tanks. By means of shear gates and independent supply channels to each tank, considerable elasticity is secured in operation. By means of this provision, the wastes from any source may be introduced into any of the four disinfecting tanks where the proper disinfection may be carried on. This feature of the operation of the installation will be made the subject of special experiment and study. The disinfectant which it is proposed to use is a 3 percent. solution of liquor, cresolis compositus, which will be discharged into the tank through openings in the cover. For the purpose of obtaining a thorough mixing of the disinfectant with the wastes, a grid of ½-inch perforated lead pipe will be placed in the bottom of each tank for the appli-

cation of compressed air under a pressure of 5 pounds per square inch. Air will be furnished by a compressor located in the pump and electric station. The tanks will be entirely underground and accessible only through manholes in the cover. The effluent from the tanks will be discharged into a manhole about 100 feet to the west of the tanks, at which point it will enter the domestic sewerage system.

SEWAGE PURIFICATION PLANT.

The sewage purification plant has been designed on a basis of 5,000 gallons flow in twenty-four hours. It is estimated by the engineer designing the plant that this flow will consist of 2,000 gallons of domestic sewage and 3,000 gallons of disinfected sewage.

Screen Chamber. The screen chamber, which is rectangular in plan, is $2\frac{1}{2}$ feet by $5\frac{1}{2}$ feet by $1\frac{1}{4}$ feet in depth. This structure is of concrete construction and is covered by means of loose planks. The screen, which is 2 feet by $5\frac{1}{2}$ inches by 1 foot $7\frac{3}{4}$ inches, will be made of $\frac{3}{8}$ -inch iron rods bolted to 2-inch by $\frac{1}{2}$ -inch iron bars, and will have clear openings of $\frac{3}{4}$ -inch. The screen will be inclined at an angle of 45 degrees and will rest against a wooden platform on to which the screenings may be readily raked. The upper end of the screen is provided with a quarter bend to facilitate raking.

Settling Tank. The settling tank is a covered concrete structure, 5 feet by 10 feet in plan with a depth to the flow line of 6 feet, thus giving it a capacity of 2,475 gallons or a period of flow of twelve hours based on a daily flow of 5,000 gallons. The tank is provided with a 2-inch cypress baffle which extends across the width of the tank and is located 3 feet from the influent end and $2\frac{1}{2}$ feet above the bottom of the tank. The outlet to the dosing tank consists of a 6-inch cast iron pipe, the invert of which is one foot below the flow line. No provision is made for removing sludge from the settling tank. The elevation of the bottom of the tank is too low to permit draining by gravity, and the liquid portion will necessarily be removed by pumping. The sludge will be removed by buckets and buried. The tank is made accessible by a 2-foot square opening located in the center of the roof.

Dosing Tank. The dosing tank, which adjoins the settling tank, is built of concrete and is $7\frac{1}{2}$ feet square in plan. This tank will be equipped with two alternating siphons of the Pacific Flush Tank type. The drawing depth of the siphons is $2\frac{1}{2}$ feet, giving the tank a capacity of 1,055 gallons, or a period of flow of 5.1 hours based on the capacity for which the plant is designed. The total retention period in the settling and dosing tanks is thus 17.1 hours. The dosing tank is covered by a 4-inch concrete roof in which is placed a 2-foot square opening located directly over the siphon. No provision is made for draining the dosing tank other than through the siphon.

Sand Filters. As shown on the plans, two intermittent sand filters will be provided, each $29\frac{1}{2}$ feet square, making the total filtering area 1741 square feet, or 0.04 acre. Based on the above area and a daily flow of 5,000 gallons, the rate of filtration will be 125,000 gallons per acre per day. The filtering material will consist of a layer of sand $2\frac{1}{2}$ feet in thickness, having a uniformity coefficient of not less than $3\frac{1}{2}$ and an effective size of from 0.20 m.m. to 0.45 m.m. The sand will be supported by 6 inches of graded gravel which will be placed directly over the underdrains. The filters will be underdrained by two lines of 4-inch tile spaced 12 feet $10\frac{1}{2}$ inches on centers and located $6\frac{1}{2}$ feet from the ends of the bed. The tile will be laid in valleys 10 inches in depth. The sewage will be applied to the surface of the sand through single lines of 12-inch channel pipe which terminate at the centers of each bed and discharge on to crushed stone.

For the purpose of inspecting the filter effluent, an effluent manhole is provided and is located a short distance south of the filters. The effluent from the plant will discharge into a 6-inch farm tile at a point 110 feet south of the plant. This tile discharges into the head of a small stream about 1,000 feet south of the plant. This stream, which is dry throughout the summer months, flows through a rather sparsely settled country and discharges into a small tributary of Black Lick Creek which in turn empties into Big Walnut Creek about eight miles southeast of Columbus.

SUMMARY.

A review of the foregoing indicates that the proposed sewage purification plant for the State Serum Institute, as shown on plans submitted by Mr. A. Elliott Kimberly, consulting engineer, should effect a satisfactory degree of purification. Although little is known of the exact character of the wastes incident to the operation of the institute, it is thought that the proposed method of disinfecting these wastes should prove satisfactory. It may be noted that the operation of the disinfecting tanks will be under the direct supervision of the expert veterinarians in charge of the institute, who contemplate doing some experimental work relative to the use of disinfectants in connection with the treating of wastes containing the virus of hog cholera.

ACTION OF THE BOARD.

At a meeting held July 18th, 1912, the State Board of Health considered these plans and specifications for a proposed sewerage system and sewage purification plant for the State Serum Institute, near Reynoldsburg, submitted by Mr. A. Elliott Kimberly, consulting engineer for the State Board of Agriculture, July 5th, 1912, and they were approved subject to the following conditions:

- 1st. That samples of the filtering material be submitted to and receive the approval of the engineer of the State Board of Health before being placed;

2nd. That the officials of the Institute appoint a caretaker to attend to the operation of the sewage purification plant;

3rd. That the officials of the Institute furnish to the State Board of Health at monthly intervals the results of the studies and experiments regarding the disinfection of the sewage; and

4th. That this approval be void unless the proposed sewerage system and sewage purification plant shall have been constructed prior to August 1st, 1913.

REPORT ON PROPOSED ADDITIONAL SEWERAGE FOR SANDUSKY.

On October 15th, 1912, Mr. R. L. J. Wagar, city engineer, of Sandusky, submitted plans for proposed additional sewerage for Sewer District No. 13, Sandusky. On October 21st, 1912, revised plans for proposed sewerage for the Mills Creek district, Sandusky, were received from Mr. Wagar. On October 16th, 1912, the principal assistant engineer visited Sandusky and made an examination of the proposed improvements. The following report was submitted:

The city of Sandusky, with a population of 20,000, is located in Erie County on Sandusky Bay. It is provided with a fairly complete system of combined sewers, discharging through some 18 outlets into Sandusky Bay. The water supply of the city is taken from Sandusky Bay off the northeast water front and is purified by means of a filter plant of the rapid or mechanical type. At the present time reconstruction of the plant is in progress.

Proposed Additional Sewerage for Sewer District No. 13. Sewer District No. 13 borders the northeasterly water front of the city. The plans for proposed sewer construction in this district provide for the installation of a combined system of sewers which will discharge through a main interceptor into the existing McEwen Street sewer, a short distance above its outlet. A number of sewers at present discharging into a cove at the northeasterly water front of the city will be intercepted by the proposed sewer. The district to be served is strictly residential in character and the sewage will, therefore, be of domestic origin. The present population of the district is about 100, and the ultimate population will be approximately 800.

At the present time sewage from the district discharges through five outlets which serve sewers of comparatively short lengths. These outlets are at a small cove formed by a railroad embankment. The cove is connected with Sandusky Bay by means of a small runway for boats through the railroad embankment. Nuisances are caused in the cove at certain seasons of the year. The water works intake conduit passes under the run-way between the cove and the Bay. A leakage in the line at this point would be serious. The proposed sewer construction will probably not increase materially the amount of sewage discharged into Sandusky

Bay. Conditions will be improved by the abatement of nuisances caused by the discharge of sewage into the cove and furthermore the point of discharge at the McEwen Street outlet will be somewhat farther removed from the water works intake. However, this outlet is only 2350 feet southeast of the intake and the pollution of the water supply is, therefore, probable.

Proposed Sewerage for the Mills Creek District. In December 1911, the State Board of Health disapproved of proposed sewerage for the Mills Creek district, and the Board at this time called attention to the necessity of a comprehensive study of the water supply by an expert sanitary engineer with a view of securing the supply beyond the influence of the sewage of the city; and also to the danger in increasing the pollution of the Bay by the construction of new sewers before the water supply improvements have been made. Following this the city took steps to improve the purification plant by employing an engineer to furnish plans. The extension of the water works intake to a point beyond local pollution was, however, given no consideration. In June 1912, plans for enlargement and improvement of the water purification plant were submitted to the State Board of Health, and at this time attention was again called to the necessity of extending the water works intake to a more suitable location.

In the submission of revised plans for sewerage in the Mills Creek district, it is desired that the Board reconsider its former action disapproving the plans, in the light of improvements which are being made at the water purification plant.

The Mills Creek district is located at the extreme westerly portion of the city, at a point farthest removed from the water works intake. Mill Creek is at present polluted seriously by wastes from the Kuebler Stang Brewery and the Sandusky Wine Company, and is the cause of numerous complaints. The proposed sewer will intercept these wastes and carry them to the Bay where dilution will be great enough to avoid nuisance. The district is at present sparsely populated, and is used to only a limited extent for residential purposes. For a number of years the sewage for not over 200 persons will be discharged. The location of the outlet is 100 feet west of the docks of the M. A. Hanna Coal Company. The outlet will be carried to the shore line and its invert will be submerged two feet below mean water level. The location of the outlet as shown on the revised plans is more satisfactory than that shown on the original plans which contemplated the establishment of an outlet on the shore 60 feet from the main water line.

SUMMARY.

From the foregoing report it will be noted that the city of Sandusky is proposing additional sewerage in two districts located, respectively, at the northeast and at the northwest water fronts of the city.

The Mills Creek district sewer has been previously disapproved by the Board, but in considering the revised plans it must be taken into account that the city is now engaged in the improvement of its water purification plant, which will render less dangerous the pollution of Sandusky Bay. The design of the sewers for both districts is satisfactory.

It is evident that Sandusky Bay must remain as a receptacle for the sewage of the city either in its raw state or treated. Evidently, therefore, it should not serve also as the source of water supply of the city. The State Board of Health has repeatedly urged the extension of the water works intake, but thus far no consideration has been given to this much needed improvement by the city officials. In both district No. 13 and Mills Creek district sewerage facilities are required and in both cases the installation of sewers will do much to promote sanitary conditions. In considering the advisability of improving the sewers in both districts, however, an intimate relationship of sewerage conditions and the water supply at Sandusky must not be overlooked.

ACTION OF THE BOARD.

At a meeting held October 23rd, 1912, the State Board of Health approved the plans for proposed additional sewerage for sewer district No. 13, Sandusky, and revised plans for proposed additional sewerage for Mill Creek District, Sandusky, submitted by Mr. R. L. J. Wagar, city engineer, on October 15th, and October 21st, 1912, respectively, subject to the following conditions:

1st. That prior to the construction of the sewers in either district, the city present to the State Board of Health a design and estimate of cost for extension of the water works intake to a suitable location in Lake Erie; and,

2nd. That plans satisfactory to the State Board of Health for the extension of the water works intake be submitted to said Board prior to January 1st, 1913.

The authorities of Sandusky were advised as follows:

"In granting conditional approval of the proposed additional sewers the promotion of sanitary conditions within the districts to be served is considered; but the intimate relationship between the discharge of sewage into Sandusky Bay and the water supply of the city must not be disregarded.

"It is realized that Sandusky Bay is and must remain the receptacle for not only the sewage of the city, raw or treated, but also the receptacle of a large amount of pollution from vessels, industries along the shore, et cetera. Under these conditions the water in the bay is unfit for use as a public water supply and is of such character that a dangerous burden is placed upon the plant provided to purify the supply. Immediate steps should be taken to remove the water works intake from the bay.

"At some time in the future treatment of the sewage from the city will be required and this will necessitate collection of the flow to proper points for treatment. It is, however, impracticable to purify the sewage to an extent which will safeguard the water supply in its present condition, especially when the pollution reaching the bay from vessels and other sources is considered.

"The first and immediate step should, therefore, be to secure an extension of the intake and it cannot be considered a proper sanitary procedure to construct additional sewers until such extension is made."

At a meeting of the State Board of Health held November 21st, 1912, a request received November 20th, from Mr. John Bing, director of public service of Sandusky, for an extension of the time limit for the submission of plans and estimate of cost for the extension of the waterworks intake, provided in the approval of proposed additional sewerage for Sandusky given October 23rd, 1912, was granted; and the second condition of said approval was revised to read as follows:

"That plans satisfactory to the State Board of Health for the extension of the water works intake and an estimate of cost of the same, be submitted to the State Board of Health prior to March 1, 1913."

The city officials were advised that in granting the request for extension of time, the Board did not sanction the construction of the proposed additional sewers until plans and estimate of cost for the extension of the waterworks intake, satisfactory to the Board, had been submitted; and that it was not to be construed that the installation of sewers for district No. 13, or for the Mills Creek district, could be begun prior to the submission of said plans and estimate of cost to the State Board of Health.

REPORT ON PROPOSED JOINT STORM SEWER FOR THE LAKE SHORE AND MICHIGAN SOUTHERN RAILWAY COMPANY AND TOLEDO HEIGHTS, TOLEDO.

On August 19th, 1912, a communication was addressed to Mr. John R. Cowell, director of public service of Toledo, stating that it had been learned that the Lake Shore and Michigan Southern Railway Company, in co-operation with the city of Toledo, was proposing to construct sewers at Toledo Heights. In reply communications were received from Mr. Cowell on August 23rd, 1912, and September 3rd, 1912, the latter being accompanied by plans for the proposed sewer. Accordingly, one of the assistant engineers visited Toledo on September 12th, 1912, and accompanied by Mr. G. W. Tonson, city engineer, made an investigation. The following report was submitted:

The Lake Shore and Michigan Southern Railway Company is about to enlarge its yards at Air Line Junction, in the southwestern part of the city. This project requires the abandonment by the city of one of its streets, in consideration of which the Railway Company has agreed to construct a new street, including two subways under its tracks connecting Buckingham Street with Fearing Street. For drainage purposes the Railway Company has prepared plans for a storm sewer to be laid under

this street. Also, in order to provide drainage for territory in Toledo Heights contiguous to the railroad property, the city has agreed to pay the additional cost incident upon enlarging the proposed sewer sufficiently to drain this area, which covers about 600 acres.

Proposed Sewers. The plans submitted show only the main sewer with proposed points of connection for four lateral sewers. These laterals, which are not as yet designed, will not be constructed in the immediate future. The main sewer, which is now being built, consists of about 5,500 feet of two ring circular brick sewers, ranging in size from 24 to 60 inches, and constructed in tunnel. The sewer will be laid at a minimum depth at the upper end of about 25 feet below the surface and will have a minimum grade of 0.15 per cent. Manholes will be placed at all changes of grade and direction and at all street intersections. The great depth of the sewer is necessitated by the cuts in the street for overhead railroad crossings.

No sewage or other wastes, other than storm water, will be permitted to enter the sewer and on account of the depth and size of the main sewer, it is not probable that direct connections for such purposes will be made. The possibility of the improper use of future laterals, however, should be recognized. At the present time the district which may be made tributary to the proposed storm sewer is provided with a fairly complete system of sanitary sewers. The outlet of the sewer is in Swan Creek at a point about 500 feet north of South Avenue. A concrete abutment will be constructed at the outlet.

SUMMARY.

The proposed sewer will be constructed to receive storm water only. The outlet will be in Swan Creek.

The plans show the main sewer only as the laterals will not be constructed in the immediate future.

The proposed sewer is satisfactorily designed.

ACTION OF THE BOARD.

At a meeting held October 23rd, 1912, the State Board of Health approved the plans for a proposed joint storm sewer for the Lake Shore and Michigan Southern Railway Company and Toledo Heights, submitted by John R. Cowell, director of public service, on September 3rd, 1912, subject to the following conditions:

1st. That the council of the city of Toledo pass an ordinance,* satisfactory to the State Board of Health, defining the use of the sewer; the said ordinance to prevent the use of the main sewer or any future laterals to receive sewage or other wastes; and

2nd. That this approval shall be void unless the said ordinance shall have been passed and a certified copy filed with the Secretary of the State Board of Health prior to December 1st, 1912.

*Ordinance passed November 18th, 1912, and filed with the State Board of Health November 22nd, 1912.

REPORT ON PROPOSED SEWERAGE FOR THE TOLEDO GLASS COMPANY, TOLEDO.

On July 13th, 1912, and July 26th, 1912, communications were received from Mr. R. G. Ewing, real estate agent of Toledo, in reference to proposed sewerage for The Toledo Glass Company. On August 13th, 1912, another communication was received from Mr. Ewing, accompanied by a resolution of council of the city of Toledo, granting permission for the construction of the proposed sewer, and also containing the approval of same by the city engineer. On August 5th, 1912, the engineering assistant visited Toledo and made an investigation of the site and informally advised that plans be prepared for a separate system of sewers for the factory. On September 9th, 1912, plans were received from The DeVore-McGormley Company, engineers, of Toledo, for a proposed sanitary sewer and sedimentation tank for The Toledo Glass Company. Accordingly, on September 12th, 1912, one of the assistant engineers visited Toledo and made another investigation. Based upon this visit and also upon a review of the plans, the following report was submitted:

The property of The Toledo Glass Company, about seven acres in area, is located in the extreme north-western part of the city of Toledo, on the south side of the Boulevard, a short distance east of Ten Mile Creek. The Toledo Glass Company has under construction on this site, several buildings in which will be installed an experimental glass plant. The number of persons at the plant is expected ultimately to be not over 60. On a basis of 35 gallons per capita the sewage flow will be about 2,100 gallons per 24 hours. On account of the elevation of the property and the present location of the city sewers, it is impossible to connect with the latter for the purpose of discharging sanitary sewage or storm water.

Proposed Sanitary Sewer. The proposed sanitary sewer will extend from the factory buildings across the company's property about 400 feet to the Boulevard, where a sedimentation tank will be constructed, and hence along the Boulevard where a right of way has been procured, a distance of about 600 feet to an outlet in Ten Mile Creek. The sewer will be constructed of 6-inch vitrified pipe and will be laid on a constant grade of approximately 0.9 per cent. There are no manholes provided for on the plans. The sewer below the sedimentation tank will have several changes in direction. Manholes should be provided at two points at least on this line and the sewer should be constructed on straight lines between these points. The outfall will be carried to the edge of the stream and discharged at an elevation which is about 2 feet below the normal water level in the creek. The outlet may be at times exposed.

Sedimentation Tank. The sewage will be clarified by means of a sedimentation tank. The plans show this tank to be located within about 15 feet of the Boulevard. During the recent visit an investigation was

made of the possibility of locating the tank at a point further removed from the highway, thus preventing a possible nuisance at times to passers-by. On account of the topography of the property, however, and the location of the proposed buildings, it was found that it will be impossible to place the tank more than about 65 feet from the Boulevard, without interfering with building construction. It will be located as far as possible from the highway. As the tank is covered, it is not probable that a nuisance will be created. There are no residences in the vicinity.

The plans show the sedimentation tank to be constructed of concrete and to consist of a screen chamber, a rectangular sedimentation tank, and a circular sludge well. The screen chamber is 3 feet by 2 feet in plan, and covered with a wooden cover. The screen consists of 26, 1½-inch by 1-inch iron bars, spaced ⅞ inch center to center. It rests in a groove in the bottom of the concrete and can be easily removed. The screen is inclined away from the flowing sewage. The sedimentation tank is 10 feet by 3 feet 10 inches in plan by 4 feet 3 inches average depth to the flow line, and has a capacity of about 1,200 gallons. On a generous basis of 3,000 gallons of sewage daily, the tank will provide a retention period of 9.6 hours. Wooden hanging baffles are provided at points 1 foot from the inlet and outlet, respectively, and extending about 2 feet below the flow line. A manhole is placed in the cover of the tank. The bottom of the tank slopes to one point, in the center line of the tank and 2½ feet from the inlet end, where a sludge drain is provided, leading to a sludge well. This well, which is located near the sedimentation tank, is circular in construction with vertical sides, and is 3 feet in diameter by 11 feet 3 inches below the surface. The sludge will be removed by means of a hand pump into a tank wagon. The sludge drain is closed at its outlet in the sludge well by means of a hinged flap valve. This will probably not hold tight. The drain should be closed by means of a removable plug or tight valve at the inlet end.

SUMMARY.

In conclusion it may be stated:

1st. Manholes should be placed at two points at least on the out-fall sewer and the sewer should be constructed on straight lines between these points.

2nd. On account of the topography of the site and the location of buildings, the sedimentation tank cannot be removed a considerable distance from the highway. It will be constructed, however, about 50 feet above the point shown on the plan. This location will probably be satisfactory on account of the closed construction of the tank.

3rd. The tank is in general satisfactorily designed and is of adequate capacity to provide for the quantity of sewage expected. A removable plug or tight valve should be placed at the inlet end of the sludge drain instead of a flap valve at the outlet end as shown.

4th. A responsible caretaker should be employed to clean the screen frequently and to otherwise keep the plant in proper running order.

ACTION OF THE BOARD.

At a meeting held October 23rd, 1912, the State Board of Health approved the plans for a proposed sanitary sewer and sedimentation tank for The Toledo Glass Company, submitted by The DeVore-McGormley Company, engineers, September 9th, 1912, subject to the following conditions:

1st. That the tank be abandoned and removed when connection to the city sewers shall have become available;

2nd. That the tank be located on the line of the sewer at least fifty feet above the point shown on the plans;

3rd. That the outfall sewer extending from the tank to the outlet be provided with at least two manholes and be constructed in straight lines between manholes;

4th. That the outlet be constructed of cast iron pipe, submerged below low water of the stream;

5th. That no discharge of sludge be permitted to reach the stream receiving the effluent; and

6th. That this approval shall be void unless the proposed sewer and sedimentation tank shall have been constructed prior to July 1st, 1913.

REPORT ON PROPOSED SEWERAGE AND SEWAGE PURIFICATION FOR WILDWOOD ADDITION, NEAR TOLEDO.

On December 5th, 1912, Mr. R. B. Wiltsie, president of The Wiltsie Realty Company, Toledo, submitted plans for proposed sewerage and sewage purification for the Wildwood Addition near Toledo. The plans were prepared by Mr. Joseph Hofman, civil engineer, and Mr. George Champe, consulting engineer for the company. On December 6th, 1912, one of the assistant engineers visited Toledo and made an examination of the proposed improvement. Based on the results of this examination and a study of the plans submitted, the following report was prepared:

Wildwood Addition is located in Adams Township, Lucas County, immediately southwest of the city of Toledo. It lies in the valley of Delaware Creek, a tributary of the Maumee River, immediately south of the corporation line of the city of Toledo and between the rights of way of the Wabash Railroad and Ohio Electric Railway. The tract contains 55 acres upon which it is intended to lay out 188 building lots, streets, etc. Estimating the ultimate construction of 150 dwellings, the population will reach about 750.

Proposed Sewerage. The plans of the engineers provide for the installation of about $1\frac{1}{3}$ miles of sewers comprising 6-inch, 8-inch, and

10-inch vitrified pipe. The system entirely covers the tract and is designed for the removal of domestic wastes only. Storm water will be separately cared for in storm sewers. The design of the system is satisfactory, the lines being laid at good grades and being satisfactorily provided with manholes and flush tanks.

Proposed Sewage Purification. The plans of the engineers provide for the treatment of the sewage by means of a septic tank. It is proposed to locate the tank in the extreme southeasterly portion of the addition in the valley of Delaware Creek. This location is not entirely satisfactory inasmuch as it is proposed to construct several residences within a few hundred feet of the tank. Before entering the tank the sewage will pass through a screen chamber, constructed of concrete and covered with a wooden roof. The bottom of the screen chamber is depressed one foot below the flow line which will give an opportunity for the collection of solid putrescible matter, the decomposition of which will result in the production of odors.

The septic tank is 24 by 12 feet in plan and 6 feet deep to the flow line. Its capacity is, therefore, 13,000 gallons, representing a period of retention of 8.9 hours on a basis of a sewage flow of 35,000 gallons per day. It is proposed to construct the tank of concrete and to cover it with an arched concrete roof placed beneath the surface of the ground. Two manholes will be provided for the inspection and cleaning of the tank. A sludge drain from the bottom connects with a sludge well near the tank, the details of which are insufficiently shown on the plans. From this sludge well the solid matter will be removed by means of a sludge pump. At the outlet end of the tank a channel extending across the tank will collect the flow. From this channel the effluent will be carried through 10-inch pipe about 250 feet to a submerged outlet in Delaware Creek.

Delaware Creek above the point of outlet has a watershed area of about three square miles and its flow during dry seasons is almost negligible. To prevent the production of a nuisance in the stream, a rather high degree of purification of the sewage is required. Below the point of outlet the stream flows about one-half mile to its confluence with the Maumee River. The intake for the public water supply of Toledo is located about three-fourths mile above the mouth of Delaware Creek. Inasmuch as the direction of flow of the Maumee River is dependent upon the stage of Lake Erie and the direction of the wind currents, it is evident that the pollution contributed by Delaware Creek may be carried upstream to the water works intake. A high degree of purification of the sewage from Wildwood Addition is, therefore, required from the standpoint of the prevention of a nuisance in Delaware Creek, and also from the standpoint of protecting the quality of the water supply of Toledo.

ACTION OF THE BOARD.

At a meeting held December 12th, 1912, the State Board of Health disapproved the proposed sewerage and sewage purification for Wildwood Addition, near Toledo, as shown on plans of Mr. Joseph Hofman, civil engineer, and Mr. George Champe, consulting engineer for The Wiltsie Realty Company, and submitted by Mr. R. B. Wiltsie, president of the The Wiltsie Realty Company, on December 5th, 1912.

The Wiltsie Realty Company and their engineers were advised that while the general design of the sewer system was satisfactory, the proposed method of treatment of the sewage was inadequate.

REPORT ON PROPOSED SEWERAGE AND SEWAGE PURIFICATION FOR URBANA.

On February 7th, 1912, Mr. C. S. Pratt, city engineer of Urbana, submitted plans for sanitary sewers for the city. These plans included no provision for sewage purification works, and at the meeting held February 15th, 1912, the Board voted to withhold its approval of these plans, and advised that, while the plans for sanitary sewers were in general satisfactory, before approval was given the Board would require that plans for a sewage purification plant, satisfactory to the State Board of Health, be submitted.

On March 9th, 1912, Mr. A. Elliott Kimberly, consulting engineer for the city, submitted plans for sewage purification works to be constructed in connection with the proposed sewers. Based on previous visits by representatives of the engineering department and on an examination of the plans submitted, the following report was prepared:

Urbana, having a population of 7,800, is located in the central portion of Champaign County at the headwaters of Dugan Brook, which enters the Mad River two and one-half miles southwest of the city. The topography within the city is rather flat, drainage taking place in a southwesterly direction by means of Dugan Brook.

The city is provided with a public water supply, installed by a private company in 1878 and purchased by the city recently at a cost of \$100,000. The water supply is in general use and the average daily per capita consumption is approximately 100 gallons. The city has been for a number of years in need of an adequate system of sewers. At the present time only a few private sewers have been constructed, and the disposal of wastes takes place principally by means of the usual privy vaults. This custom is attended by serious soil pollution, which possibly affects the public water supply. It is now the intention to proceed with the construction of sanitary sewers, the immediate necessity being urged by the proposed paving of streets. At the present time only a portion of the sew-

erage system will be constructed, although it is planned ultimately to furnish the entire built up portion with sewerage facilities.

In 1905 the State Board of Health approved plans for proposed sewerage and sewage purification. Subsequent to this, however, owing to lack of funds, no progress was made in the installation of sewers. The plans recently submitted provide for a sewerage system substantially the same as that designed and approved in 1905, although they contemplate the extension of the trunk sewer to an outlet more properly removed from the city.

PROPOSED SEWERAGE.

Briefly, the plans of the city engineer provide for the construction of 13.7 miles of sewers as a first installation, with the ultimate addition of 7.3 miles. The main trunk sewer will have a total length of 14,460 feet and will be constructed as follows:

20-inch vitrified pipe.....	2,970 feet.
18-inch vitrified pipe.....	2,670 feet.
15-inch vitrified pipe.....	1,990 feet.
12-inch vitrified pipe.....	5,720 feet.
10-inch vitrified pipe.....	860 feet.
8-inch vitrified pipe.....	450 feet.

The laterals will be as follows:

8-inch vitrified pipe.....	56,300 feet.
10-inch vitrified pipe.....	1,630 feet.

For proposed extension there are provided the following:

10-inch vitrified pipe.....	4,340 feet.
8-inch vitrified pipe.....	31,540 feet.
6-inch vitrified pipe.....	2,640 feet.

Total 38,520 feet, 7.3 miles.

The general design of the system appears satisfactory, and suitable grades have been provided to secure a cleansing velocity. A point of importance in the construction of the sewers is the necessity of securing perfectly watertight joints. The gravel formations encountered in trenching probably contain ground water in abundance, which must be excluded from the sewers to avoid overburdening of the purification works. The main trunk sewer will convey the sewage from the system in a south-westerly direction to Dugan Brook, to a point some 4,000 feet from the corporation line of the city, where it is intended to locate the sewage purification works.

Dugan Brook is a stream of small flow, having a watershed area of but a few square miles above the proposed outlet. To avoid the production of a nuisance, therefore, sewage purification works are necessary. A site available for purification works has been purchased by the city.

This site is located on Dugan Brook at the proposed outlet. The site is satisfactory in every respect for the location of a sewage purification plant, being well removed from the city and isolated from dwellings.

PROPOSED SEWAGE PURIFICATION WORKS.

The plans of the consulting engineer provide for the construction of a sewage purification plant consisting of a screen chamber, an Imhoff tank, a sludge filter, and primary and secondary contact filters. The plant is designed for an ultimate population tributary of 6,000 and a sewage flow of 600,000 gallons per day.

Site. The property which is now owned by the city for the location of sewage purification works has an area of six acres and is 230 feet by 1,200 feet in its dimensions. The tract lies immediately east of Town Branch and as stated, one and one-half miles from the city. The location is especially well selected as regards the proximity of dwellings, the nearest house being 3,500 feet from the center of the tract. Furthermore, the likelihood of future development of the city in this direction is slight as the topography will discourage building operations. Some difficulty may be encountered in the construction of the plant owing to the abundance of ground water in the gravel formation encountered near the surface.

Screen Chamber. The 20-inch outfall sewer enters an uncovered rectangular, concrete screen chamber 4 feet by 8 feet, 6 inches in plan and 2 feet in depth. A single screen constructed of iron bars with free spaces of one inch, is provided. The screen is placed at an angle of 45 degrees with the horizontal. In cleaning, the screen is not to be removed and a rake will be provided for this purpose. A weir to make possible the measurement of the sewage flow is provided, to be placed in slots in the screen chamber.

Imhoff Tank. From the screen chamber the sewage flows through an open concrete channel 20 inches wide to the Imhoff tank. To provide for reversal of the sewage flow through the tank, this channel leads to both ends of the tank, the direction of flow being controlled by stop planks. The Imhoff tank is of concrete construction, uncovered, and consists of a sedimentation compartment, rectangular in plan, beneath which are two circular sludge wells. The sedimentation compartment is 54 feet 4 inches in length and 16 feet in width, and has a depth from the flow line to the apexes of its false bottom of 8 feet. The false bottom of the sedimentation compartment is to be built with two V shaped sections, at the apexes of which are slotted openings 10 inches in width extending the length of the compartment through which the subsidiary solids enter the sludge compartment below. Hanging baffles are provided, extending across the ends of the tank to a point 18 inches below the flow line. A submerged baffle extends across the central portion of the tank to retard and distribute the flow.

The sludge wells are each 20 feet in diameter and have inverted conical bottoms, the apexes of which are at a depth of 19 feet below the flow line of the tank. The gas produced by the digestion of the sludge escapes through rectangular openings extending through the sedimentation compartment directly upon the central portion of each sludge well. For the removal of the accumulated sludge, 8-inch cast iron pipes leading from the apexes of the sludge wells to a manhole at the surface, are provided. There is thus available a static head of five feet to create a movement of the sludge. To provide means for loosening the sludge, should this become necessary, a system of 2-inch water piping is provided at the bottom of the sludge well. For the present this piping will not be used as no water pressure is available, but if necessary a portable pumping outfit will be provided.

The capacity of the sedimentation compartment is 34,000 gallons, which corresponds to a period of retention of 1.37 hours based on an ultimate sewage flow of 600,000 gallons. This sewage flow will not be reached for a number of years and in the meantime the tank will provide a period of retention greatly in excess of the above figure. This slow movement of the sewage through the tank may or may not be detrimental to the quality of the effluent. It would appear advisable that flexibility of operation be provided by two tanks of a combined capacity equal to the single tank proposed. The capacity of the sludge wells is such as to provide for four months accumulation of sludge on the basis of a deposition of 0.0035 cubic foot per capita per day. This assumption according to available information is correct.

As has been stated, the direction of flow through the tank may be reversed, and this will follow in its proper operation in order to provide equal deposition of sludge in both wells.

Sludge Filter. The sludge will be removed from the tank at intervals and will be discharged upon a sludge filter located near by. This sludge filter has a total area of 1,000 square feet, being 31 feet, 7 inches square in plan. The area is assumed on the basis of 1-6 square foot per capita tributary to the sewers. The filtering material will consist of a layer of coarse sand 9 inches in thickness, resting upon graded gravel of an average thickness of 9 inches. The area of the sludge filter provides for the discharge of 1,000 cubic feet at an application, or approximately forty per cent of the storage capacity of one sludge well. With the plant operated at its capacity, therefore, sludge should be removed every seven weeks.

Primary Contact Filters. The settled sewage from the Imhoff tank flows to a control house through a concrete flume in the dividing walls between the contact filters. By means of apparatus to be installed in this control house, the sewage will be applied to each of the contact filters in sequence. The primary filters, of which there are four units, are of concrete construction throughout and will be built as nearly watertight

as possible. Each unit is 82 feet 6 inches by 104 feet in plan and has a depth of filtering material of 3.76 feet. The total area of the primary filters is therefore 0.75 acre. The filtering material will be locomotive or boiler cinders of a high grade, washed and screened to a size ranging from $\frac{3}{4}$ inch to $1\frac{1}{2}$ inches. The sewage is applied at the surface of each unit by shallow concrete channels extending along the dividing walls between the units. The sewage will flow over the edges of these baffles at an elevation of about $4\frac{1}{2}$ inches above the surface of the filtering material. Small holes are provided in the floor of the channels to provide for a complete drainage after the bed has been filled. It is important to note the necessity of keeping these drainage holes unclogged. The method of application of the sewage appears satisfactory and will probably tend to concentrate clogging should this occur. Drainage from the filters takes place through central collecting conduits which slope to the center of each unit. Laterals spaced 8 inches on centers lead to this collecting conduit. By this means satisfactory drainage should be secured. Main collectors conduct the effluent from the center of each unit to the main effluent drain leading to the secondary contact filters. The design of the primary contact filters is such as to provide an ultimate rate of 800,000 gallons per acre, 213,000 gallons per acre foot, and a population tributary of 8,000 per acre and 2130 per acre foot. The capacity of each unit, assuming 33 per cent of voids in the filtering material, is 78,800 gallons, which corresponds to one cycle in 12.6 hours. The average period of filling with a sewage flow of 600,000 gallons will be three hours, and it is designed to provide a period of contact after the bed has been filled of one hour before discharging to the secondary filters.

Secondary Contact Filters. The secondary contact filters are in their principal features similar to the primary filters. The effluent from any unit of the primary filters may be applied to either of the two secondary filters, and thus flexibility of operation is provided. The secondary filters are each 82 feet 6 inches by 118 feet and have a depth of filtering material of 3.33 feet. The capacity of each of the secondary filters is therefore equal to that of one of the primary units. The filtering material is to be of a high grade of cinders, washed and screened to a size ranging from $\frac{1}{4}$ inch to $\frac{3}{4}$ inch. The primary filter effluent will be applied in a manner similar to that used in the application of the primary filters, and the effluent after a contact period will be discharged by the operation of timed siphons.

The capacity of the secondary filters, assuming 33 per cent voids, is 79,320 gallons, and with a sewage flow of 600,000 gallons there will be a rate of application of 1,364,000 gallons per acre per day, or 409,000 gallons per acre foot. The population tributary is 13,640 per acre and 4090 per acre foot.

Disposal of Effluent. From the secondary contact filters the effluent will be intermittently discharged into Town Branch, which passes

the plant a short distance to the west. The invert of the main outlet is at an elevation 0.5 foot above high water mark of the stream, and it will therefore be seen that high stages in the stream will not affect the operation of the plant.

ACTION OF THE BOARD.

At its meeting held March 21st, 1912, the State Board of Health approved the plans for sanitary sewers submitted by Mr. C. S. Pratt, city engineer, February 7th, 1912, and the plans for sewage purification works submitted by Mr. A. Elliott Kimberly, consulting engineer, March 9th, 1912, for the city of Urbana, upon the following conditions:

1st. That the sewage purification works be constructed and ready for operation before any connections are made to the proposed sewers;

2nd. That all reasonable precautions be taken in the construction of the sewerage system to prevent the entrance of ground water into the sewers;*

3rd. That the sewage purification works be altered, repaired or enlarged, when in the opinion of the State Board of Health such alterations, repairs, or enlargement shall become necessary;

4th. That detailed plans of the automatic dosing and discharging apparatus be submitted to the State Board of Health;*

5th. That full detailed plans of the primary tanks be submitted to and receive and approval of the State Board of Health;

6th. That samples of filtering material for the contact filters and sludge filter be submitted to and receive the approval of the engineer of the State Board of Health;

7th. That the city council appoint a superintendent of sewers whose duties shall include supervision of the sewerage system and the operation of the sewage purification works; such operation to be at all times satisfactory to the State Board of Health; and

8th. That this approval be void unless construction of the proposed sewerage system and sewage purification works shall have been commenced prior to April 1st, 1913.

STATEMENT REGARDING THE ILLEGAL INSTALLATION OF COMBINED SEWERS AT WESTWOOD, CINCINNATI.

On January 15th, 1912, the attention of the State Board of Health was called to the fact that a system of combined sewers had been installed at Westwood, a community located within the city of Cincinnati in its extreme westerly portion. At this time a communication was received from Mr. John T. Stanley, a resident of Westwood, complaining of a nuisance caused by the discharge of sewage from the Westwood sewers. On April 6th, 1912, a communication was addressed to Mr. Victor T. Price, director of public service, of Cincinnati, calling his attention to the fact that plans for sewers for Westwood had not been submitted to the State Board of Health for approval as provided in Sec-

*(Revised plans submitted August 21st, 1912. Secretary.)

tion 1240 of the General Code. It was requested that formal application for approval of the sewers be submitted to the State Board of Health. In a communication dated April 9th, 1912, the director of public service advised that the matter had been referred to the city solicitor for advice. Following this no further communication was received from the city officials of Cincinnati.

On August 21st, 1912, after additional verbal complaints regarding the discharge of untreated sewage from Westwood had been received, one of the assistant engineers visited Cincinnati and made an examination of the sewerage conditions at Westwood.

Westwood is a residential district, located about six miles northwest of the city of Cincinnati, and is now included within the corporate limits of the city. In 1910 plans were prepared for a system of combined sewers covering the entire district. These plans were not submitted to the State Board of Health for approval.

During 1910 and 1911 about one-third of the system was installed including the main outfall sewer. This sewer is nine feet in diameter and discharges at the intersection of Bridgetown Road and Creek Road, some distance southwest of the built up portion of the community. The stream receiving the sewage is one of the headwaters of Muddy Creek, which enters the Ohio River about seven miles below the outlet. During dry weather there is practically no flow in the stream at the point of outlet and a decided nuisance is caused by the sewage discharged.

ACTION OF THE BOARD.

At a meeting held October 23rd, 1912, the State Board of Health considered this report upon the illegal installation of combined sewers at Westwood and the Secretary was instructed to inform the director of public service that the installation of the system of combined sewers at Westwood was in violation of Section 1240 of the General Code, inasmuch as plans were not submitted to the State Board of Health for approval; and as a result of the installation of the combined sewers without provision for treatment of the sewage, a nuisance was caused at the outlet; also that the State Board of Health would require the city of Cincinnati to submit, prior to January 1st, 1913,

(a) Plans for a system of sanitary sewers for the district and a sewage purification plant, making possible the use of the existing system and outlet for storm water only, or

(b) Plans for a sewage purification plant to treat the dry weather flow from the existing system of combined sewers.

The Board was of the opinion that a separate system of sewers should have been installed instead of the combined system which was built, and to remedy conditions it would be advisable to construct an independent system of sanitary sewers.

INVESTIGATIONS UNDER THE BENSE ACT

(99 OHIO LAWS, PAGE 74, SECTIONS 1249-1261 INCLUSIVE,
GENERAL CODE.)

(583)

REPORT ON INVESTIGATION UNDER THE BENSE ACT OF THE POLLUTION OF THE CUYAHOGA RIVER AT CLEVELAND.

At a meeting of the State Board of Health on June 19th, 1912, the following petition under the Bense Act was presented by the secretary of the board of health of Cleveland:

"To the Ohio State Board of Health:

I, the undersigned, clerk of the Board of Health of the City of Cleveland, Cuyahoga County, State of Ohio, do hereby certify that the Board of Health of said city, being in session on the 10th day of June, 1912, adopted a resolution of which the following is a true copy.

Resolved, That the City of Cleveland, located in Cuyahoga County, Ohio, is discharging and permitting to be discharged, sewage and other wastes into the Cuyahoga River, and by reason thereof has so corrupted said Cuyahoga River as to give rise to foul and noxious odors, thereby creating conditions that are detrimental to the health and comfort of the citizens of Cleveland, Cuyahoga County, Ohio, who reside in the vicinity of said river.

The State Board of Health is hereby respectfully requested to investigate the conditions complained of, and to require the said City of Cleveland to install such works or means for purifying or otherwise disposing of its sewage and other wastes as may be determined by said board, in accordance with 'An Act to authorize the state board of health to require the purification of sewage and public water supplies and to protect streams against pollution,' passed April 7th, 1908.

THE BOARD OF HEALTH, CITY OF CLEVELAND,

P. W. HARVEY, *President*,

O. E. FORD, M. D., *Clerk*,

Cleveland, Ohio."

Dated at Cleveland, Ohio, this 10th day of June, 1912.

At a meeting of the State Board of Health on May 9th, 1912, a committee consisting of Dr. William T. Miller and Mr. John W. Hill was appointed to receive communications from the Cleveland officials relative to sewerage, and later the president of the Board added to the committee Dr. Frank Warner, member ex officio, and Mr. W. H. Dittoe, chief engineer. On June 11th, 1912, in anticipation of the receipt of the above petition, the committee investigated the pollution of the Cuyahoga River. On June 14th, there were received from the board of health of Cleveland, data secured at various times by the city indicating the polluted condition of the Cuyahoga River. Based on the investigation of the committee, previous investigations by the engineering department of the Board, and a review of the data submitted by the Cleveland board of health, the following report was prepared and submitted:

The Cuyahoga River is about 80 miles long and has a watershed area of about 800 square miles. The river flows in a northerly direction through the city and enters the lake near the central portion. Its course through the city is winding so that the total length of the channel through

the city is approximately ten miles in a direct distance of five miles. The fall of the stream from the southerly corporation limits to the lake is approximately seven feet, the greater portion of which takes place in the upper few miles. For several miles above the mouth, the river is practically level, its elevation fluctuating with that of the lake. The mean velocity of flow in this sluggish portion of the stream is very slight, and frequently the current is reversed by a rise in the lake level. The maximum velocity of flow is only three feet per second.

The valley of the Cuyahoga River through the city is deep and the sides are precipitous. The valley is narrow near the mouth, but broadens out somewhat a few miles from the lake and this portion is at times submerged. The river is navigable for several miles and the lower portion of the valley is occupied almost entirely by manufacturing and shipping establishments. To maintain sufficient depth, the channel is constantly dredged, which is made necessary by the rapid accumulation of silt as well as sewage sludge.

Sources of Pollution of the Cuyahoga River. The Cuyahoga River is grossly polluted from several causes, the principal of which are the sewage from the city, wastes from manufacturing establishments, and the sewage from vessels. The sewage from approximately 44 per cent. of the city is discharged into the stream, that from the remainder being carried to two outlets into Lake Erie. There are 21 combined sewer outlets discharging into the Cuyahoga River and one outlet into Big Creek, a tributary of the river. The sewers discharging into the stream are all constructed on the combined plan and at times of storm large volumes of surface water empty into the river. The following is a list of the outlets discharging into the Cuyahoga River and the population tributary to each sewer system:

APPROXIMATE ESTIMATE OF ACREAGE AND POPULATION DRAINING INTO THE CUYAHOGA RIVER THROUGH CITY SEWERS.

Outlet No.	Location.	Acres.	Population per Acre.	Population.
4	West 45th Street.....	300	23	8,400
5	Mulberry Street	20	23	460
3	Front Avenue	51	12	612
6	Main Street	1	12	12
7	St. Clair	1	12	12
8	Superior	2	12	24
9	West 25th Street.....	75	23	1,725
10	French Street	5	12	60
11	Columbus Road	130	16.8	2,190
12	West 20th Street.....	2	23	46
13	Girard	2	23	46
14	Voltaire	2	23	46

APPROXIMATE ESTIMATE OF ACREAGE AND POPULATION DRAINING INTO THE CUYAHOGA RIVER THROUGH CITY SEWERS — Concluded.

Outlet No.	Location.	Acre.	Population per Acre.	Population.
15	Huron Road (Canal Road).....	33	12	396
16	West 3rd Street (Middle Bridge).....	5	32	160
17	Central Avenue	10	53	530
18	Walworth Run	3,000	30.23	90,700
19	West 7th Street.....	40	24	960
20	West 3rd Street (Upper Bridge).....	20	53	1,060
21 & 22	Kingsbury Run and Broadway.....	2,000	43.5	87,000
23	Morgan Run	2,350	21.6	50,750
24	Big Creek	600	9	5,400
		8,600		252,689

No gaugings have been made to determine the volume of dry weather flow discharging into the river, but assuming the correctness of the estimate of population served, the mean discharge is approximately 35,000,000 gallons per day.

Aside from the sewage discharged into the river, the stream also receives large volumes of manufacturing wastes from oil refineries, chemical works, breweries, tanneries, and slaughter houses. The sewage reaching the stream from vessels is also large in amount and no doubt contributes to the pollution of the stream.

Condition of the Cuyahoga River. Having in mind the natural characteristics of the Cuyahoga River, namely, its sluggish flow and low mean discharge, it is evident that the large quantities of sewage and industrial wastes produce extremely offensive conditions. During periods of maximum discharge, the river is mildly polluted, but during dry seasons the pollution becomes excessive and the stream is practically an open sewer. The inspection of the Cuyahoga River by the committee on June 11th, 1912, consisted in following the course of the stream in a boat from a point a short distance above its mouth to the entrance of Kingsbury Run about four miles above the mouth. Along this entire distance the water in the river presented an offensive appearance, being dark in color and in a state of putrefaction. The sluggish flow promotes rapid sedimentation and the sludge deposits form rapidly in the bottom of the stream. In places the surface was covered with sewage scum and at all points the evidences of sewage pollution were apparent. The odors arising from the stream were very offensive, sufficient to sicken certain members of the committee. The condition of the river, extremely offensive at the mouth, improved slightly in the vicinity of Kingsbury Run although at that point it must be stated that the river was seriously polluted.

The sewer outlets along the river discharge into the stream behind piles which support wharves, and it was therefore impossible to locate the various outlets. The very offensive appearance of the stream made it impossible to locate accurately the entrance of any sewage. In other words, the stream as a whole presented the appearance of sewage and its condition did not appear to be intensified by the entrance of additional sewage.

Analytical Results. In connection with a sanitary survey of Lake Erie made by a representative of the State Board of Health November 9th to 28th, 1911, samples of water and mud were taken from the Cuyahoga River. In the early part of 1912, in connection with a report on the sanitary condition of the Cleveland water supply, Mr. D. D. Jackson, sanitary expert, collected samples of water and mud from the river. Previous to the State Board of Health examinations in November, 1911, the river had been at high stage for a week or more and the flow was comparatively high. In spite of these favorable conditions, the analyses of water and mud indicated the presence of large amounts of organic pollution. The average of 30 analyses of samples of water from the Cuyahoga River collected during this investigation, gave the following results:

	Ox. Cons.	Dis. Ox.	Cl.	Alk.	Bact. per cc.	Coli.
Parts per million.	12.33†	11.66‡	43.0*	77.0†	179,000*	75% pos. 0.1 cc. 25% pos. 1.0 cc.

* Average 21 samples.

† Average 29 samples.

‡ Average 19 samples.

Examinations of Mr. Jackson indicated that the putrescibility of the mud taken from the harbor, opposite the Cuyahoga River, was greater than that of similar samples collected in other important American harbors. The samples of water collected by him from the Cuyahoga River showed a bacterial content of 400,000 per c. c. and *B. coli* and streptococci in 0.1 c. c. portions.

SUMMARY AND CONCLUSIONS.

As described in the foregoing report, the investigation of the Cuyahoga River at Cleveland and a review of available data, indicate that the stream is grossly polluted along its course through the city. This pollution has gradually increased during recent years and at the present time the stream is a source of nuisance to persons who find it neces-

sary to approach or cross it. Although not mentioned in the foregoing report, the present condition of the river constitutes a menace to the public water supply and its improvement would tend largely to reduce the danger of transmitting diseases through the water. From the standpoint of the creation of a nuisance, there is no doubt that the local board of health is justified in its assertion that the stream has been so corrupted "as to give rise to foul and noxious odors, thereby creating conditions that are detrimental to the health and comfort of the citizens of Cleveland."

AN ORDER OF THE STATE BOARD OF HEALTH TO THE CITY OF CLEVELAND

The following order to the mayor and council and the director of public service of Cleveland was issued September 30th, 1912:

WHEREAS, The State Board of Health of the State of Ohio, having under consideration the conditions existing in the city of Cleveland, Cuyahoga County, Ohio, as set forth in a complaint, in writing, made to said State Board of Health by the board of health of the city of Cleveland, as required by Section 1 of an Act of the General Assembly of Ohio, entitled, "An Act to authorize the State Board of Health to require the purification of sewage and public water supplies, and to protect streams against pollution," passed April 7th, 1908 (99 O. L., p. 74), did, in accordance with the duties imposed upon said Board by said act, pursue all and singular the requirements and duties to be performed by said State Board of Health, and having inquired into and investigated the conditions complained of in said complaint, and

WHEREAS, The State Board of Health, after investigating the conditions complained of, found that the Cuyahoga River is grossly polluted along its course through the city of Cleveland by sewage and other wastes discharged into said river through sewers maintained by said city of Cleveland, giving rise to foul and noxious odors, thereby creating conditions that are detrimental to the health and comfort of the citizens of Cleveland who reside in the vicinity of said river, and

WHEREAS, Acting pursuant to the requirements of the act aforesaid, said State Board of Health thereupon on the 25th day of June, 1912, notified such city so causing the pollution of said river, of its said findings, and gave said city an opportunity to be heard before said Board on the 18th day of July 1912, and

WHEREAS, On the 18th day of July, 1912, pursuant to said notice, there appeared before the State Board of Health Mr. N. D. Baker, mayor; Mr. W. J. Springborn, director of public service; Mr. John N. Stockwell, assistant city solicitor; Mr. Robert Hoffman, city engineer, and Mr. R. Winthrop Pratt, consulting engineer, representing said city, and the matters as contained in said complaint were discussed with said Board, and

THEREUPON, After such hearing, the State Board of Health found and determined that improvements and changes in said conditions aforesaid are necessary and should be made, to-wit: That the city of Cleveland be required, on or before July 1st, 1915, to cease the pollution of the Cuyahoga River and to install such works or means for purifying or otherwise disposing of its sewage or other wastes now being discharged into said river as will remove pollution from said river.

THEREUPON, On motion duly seconded, the report and findings of the State Board of Health were ordered transmitted to the Governor and the Attorney General for their action thereon.

I hereby certify that the foregoing report and findings were duly made by State Board of Health of Ohio, and that the proceedings above set forth were duly had before said Board, as shown by the minutes thereof.

E. F. McCAMPBELL,

Secretary State Board of Health of the State of Ohio.

July 22nd, 1912.

COLUMBUS, OHIO, September 30th, 1912.

The foregoing report and findings having been examined by us, respectively, the Governor of the State of Ohio, and the Attorney General of Ohio, the same are in all respects approved this 30th day of September 1912.

JULSON HARMON,

Governor of Ohio.

TIMOTHY S. HOGAN,

Attorney General of Ohio.

REPORT ON EXAMINATION OF SEWAGE PURIFICATION PLANT AT FOSTORIA.

On September 10th, 1912, one of the assistant engineers visited Fostoria for the purpose of making an examination of sewerage conditions and the sewage purification plant; and the following report was submitted:

Fostoria is a city with a population of 9,600 in 1910. It is located in the extreme western part of Seneca County on Portage Creek, which is the east branch of the Portage River. Fostoria has a public water supply with a water purification plant, a complete system of sewers, and several miles of paved streets. It is a good railroad center, five railroads passing through the city. There are several large industries in Fostoria, principal among which are plants for the manufacture of steel, nails, wire, cement, lime, and carbon appliances.

SEWERAGE.

The construction of sewers at Fostoria was started about 1893, and within a few years afterward sewers had been provided for the whole city. The city is divided into sewerage districts and the sewers are built largely on the combined plan. District No. 1 covers the eastern half of the city, while Districts Nos. 2 and 4 cover the western half. All the sewage from these three districts flows through two trunk sewers to the purification plant, located in the extreme northwestern part of the city.

In order to divert the storm water from the sewage purification plant, two different devices were constructed in the sewers, the plans for which are on file in the engineering department of the State Board of Health. For Districts Nos. 2 and 4 leaping weirs were constructed in two of the branches, while in a third branch a low dam was constructed. Both the weirs and low dam are said to be successful in divert-

ing only the dry weather sewage flow to the plant. The outfall sewer for District No. 1 is 6 feet in diameter. The dry weather sewage flow is diverted from this sewer to the sewage purification plant by means of an 18-inch interceptor located near the sewage purification plant. Just below this interceptor there was constructed a dam 3 feet 4 inches in height. By means of a valve in the screen house of the sewage purification plant the 18-inch interceptor is closed except for a few hours each day, and during such times the sewage flows over the dam into the creek. The effect of thus closing the sewer is to form a storage reservoir or sedimentation tank about 3000 feet long in the sewer. This storage was originally planned for the purpose of restricting the amount of required pumping, the amount of sewage contributed by District No. 1 being small at first. Weir readings made by the city engineer in August, 1910, however, show that District No. 1 now contributes about one-half of the sewage of the city. The only reason, therefore, for closing the interceptor at the present time is the fact that the purification plant is overtaxed, making it necessary to discharge considerable of the sewage directly into the creek. This was occurring at the time of the recent visit. The sewage was of a very dark red color from District No. 1, and gave off a strong coal tar odor. These characteristics were probably due to the wastes from the National Carbon Company's works, in the eastern part of the city. With the present quantity of sewage flow from District No. 1, the interceptor, for obvious reasons, should not be closed at any time.

SEWAGE PURIFICATION PLANT.

The sewage purification plant, which was constructed in 1896, is described in detail in the Special Report on Water and Sewage Purification in Ohio, 1908. In general the plant includes a screen house, with basket screen; two brick and concrete covered tanks, called sewage reservoirs; a pump well; a pumping plant; and a filtration area covering about 20 acres, 6 acres of which are used. Two acres of this area consist of artificially constructed sand filters in which are narrow sand trenches; four acres are underdrained with sand trenches; and the remaining area, which has been abandoned for filter purposes, consists of the natural clayey soil, underdrained.

In September, 1908, on account of the pollution of Portage Creek at the plant, a Bense Act petition was received from Mr. Charles E. Risser, clerk of Perry Township, Wood County. Investigations made by a committee of the Board showed that there was just cause for complaint and the city of Fostoria was ordered to submit plans for enlarging and changing the design of the plant in a manner satisfactory to the State Board of Health. Tentative plans were prepared by Mr. Charles Latshaw, city engineer, but on account of the fact that the constitutionality of the Bense Act was then being tested by the courts these plans were

not acted upon by the Board and little further was done to improve the plant or the conditions in the stream.

Present Condition of Plant. The sewage purification plant is now greatly overtaxed. The sewage flow through the plant, which was found by means of weir readings made by the city engineer in August, 1910, to be about 615,000 gallons per 24 hours, is now probably about the same. It is evident that the plant cannot take care of this quantity of sewage as the area of the filters is only about six acres, while the effective filtering area is very much smaller than this.

Not much information concerning the operation of the plant was obtained at the time of the inspection, due to the fact that the caretaker was not on the ground. In general, however, it was learned that the pumping plant was operated but four to six hours each day and for only six days of the week. On Sunday the raw sewage is discharged directly into the creek, while the same process occurs at intervals throughout the week. This procedure is necessary because the filter beds become ponded, due to clogging, the sewage remaining on the beds as much as two days before disappearing. A heavy deposit of sludge forms on the beds. This deposit, which is largely lime wastes from the Hocking Valley Railroad softening plant, together with considerable acid iron wastes from the works of the Seneca Wire and Manufacturing Company, were being removed from several of the beds at the time of the inspection. After this deposit is removed the beds are plowed and harrowed. The tank effluent when discharged on to the beds is very dark in color, very turbid, and gives off an offensive odor. There is a decided odor from the plant as a whole, which is noticeable at a considerable distance when weather conditions are favorable. The effluent from the plant is not clear and has a decided odor and a reddish color.

POLLUTION OF PORTAGE CREEK.

Portage Creek at and below the plant was in a filthy condition at the time of the inspection. There had been no rain for some time and the stream was at a low stage. The water in the creek, although comparatively clear above the plant, was very turbid and of a reddish orange color, typical of the acid iron wastes just below the sewer overflow outlets. There was a heavy deposit of black sewage sludge along the banks and considerable septic action was taking place. The stream was observed to be in this same condition for one-half mile below the plant. A large number of cattle drink from the stream at this point and the farmer sells a large quantity of milk to the city. It was stated by the farmer that a nuisance is created in the stream from $4\frac{1}{2}$ to 5 miles below the plant. It was further stated that all the farmers throughout this district along the stream are making complaints of the condition of the water and have been considering a suit for damages against the city.

The city of Fostoria should be required to have new plans prepared

for a sewage purification plant to take the place of the present plant, which will properly purify the sewage of the city. It should be further required that a study be made of the various industrial wastes of the city with a view to providing independent purification for those wastes which are found to be detrimental to the operation of the new plant.

SUMMARY.

An examination of the sewage purification plant at Fostoria reveals the following:

1. A dam, which was originally constructed in the outfall sewer for District No. 1, for the purpose of restricting the amount of necessary pumping, is in effect a sedimentation tank and conditions are thus caused in the sewer which, with the present increased amount of sewage flow from this district, are undesirable.

2. The capacity of the sewage purification plant is sufficient to care for but a part of the sewage flow from the city. The remainder of the sewage is discharged directly into Portage Creek without purification.

3. The sewage purification plant is greatly overtaxed, does not produce a satisfactory effluent, and there is a decided and offensive odor from the plant which is noticeable at a considerable distance under favorable conditions. The plant receives a large amount of water softening and acid iron wastes from industries in the city. These wastes form heavy deposits on the filter beds which are detrimental to the operation of the plant.

4. Portage Creek below the plant is badly polluted and is in a filthy condition. Complaints are heard from farmers along this stream for about five miles below the plant.

5. An order of the State Board of Health which was given to Fostoria in September, 1908, following a Bense Act petition, and which required the city to enlarge and change the existing sewage purification plant in a manner satisfactory to the Board, should be enforced. Also a study should be made of the various industrial wastes from the city with a view to determining their effect upon the operation of the sewage purification plant.

After giving the authorities at Fostoria a hearing the Board adopted the report of its committee, and the following order was sent to the authorities of Fostoria on December 23rd, 1912:

AN ORDER OF THE STATE BOARD OF HEALTH TO THE CITY OF FOSTORIA.

WHEREAS, The State Board of Health of the State of Ohio, having under consideration the conditions existing in and about the city of Fostoria, Seneca County, Ohio, as set forth in the complaint, in writing, made to said State Board of Health by the board of health of Perry Township, Wood County, Ohio, as required by Section 1 of an Act of the General Assembly of Ohio, entitled, "An Act to authorize the State Board of Health to require the purification of sewage

and public water supplies, and to protect streams against pollution," passed April 7th, 1903 (99 O. L., p. 74), did, in accordance with the duties imposed upon said Board by said act, pursue all and singular the requirements and duties to be performed by said State Board of Health, and having inquired into and investigated the conditions complained of in said complaint, and

WHEREAS, The State Board of Health, after investigating the conditions complained of found that the sewage and other wastes flowing into East Branch of the Portage River from the city of Fostoria have so corrupted the same as to give rise to foul and noxious odors, and to conditions detrimental to the comfort of those residing in the vicinity of said stream, and

WHEREAS, Acting pursuant to the requirements of the act aforesaid, said State Board of Health thereupon on the 3rd day of November 1909, notified the mayor and council and the director of public service of the city of Fostoria of its said findings, and gave said city an opportunity to be heard on the 19th day of January 1910, and

WHEREAS, On the 19th day of January 1910, pursuant to said notice, there appeared before the State Board of Health Mr. Chas. L. Guernsey, city solicitor, Mr. E. C. Lease, director of public service, Mr. E. A. Warner, president of council, Mr. J. A. Furining, and Mr. D. A. Lynch, private citizens, and it being stated by them that they had recently come into office and were not to blame for conditions complained of, nor thoroughly familiar with what proceedings had gone before, the matters as contained in said complaint were discussed and argued by them in the presence of said Board, and

WHEREAS, The above named representatives having promised to carry out the requirements of the State Board of Health as regards improving the condition and operation of the plant, no further action under the Bense Act was taken, it being understood that the city would within sixty days' time submit detailed drawings showing proposed method of reconstructing the existing sewage purification plant, and

WHEREAS, On the 10th day of March 1910, the State Board of Health granted the director of public service of Fostoria an extension of thirty days' time, to the sixty days granted on January 20th, 1910, in which to submit detailed drawings showing the proposed method of reconstructing the existing sewage purification plant at Fostoria, and

WHEREAS, Investigation made by the State Board of Health on September 10th, 1912, showed that improvements had not been made and that the conditions complained of still exist, the State Board of Health on the 28th day of October 1912, notified the mayor and council and the director of public service of the city of Fostoria of its findings, and gave said city another opportunity to be heard on the 21st day of November 1912, and

WHEREAS, On the 21st day of November 1912, pursuant to said notice, there appeared before the State Board of Health Mr. O. R. Wade, city solicitor, and Mr. Chas. Latshaw, city engineer of the city of Fostoria, and the matters as contained in the said complaint were then discussed and argued by them in the presence of the said Board, and

THEREUPON, After such hearing and argument the State Board of Health found and determined that improvements and changes in said conditions aforesaid were necessary and should be made, to-wit: That the city of Fostoria should be required to present to the State Board of Health for approval plans for the improvements of the sewage disposal plant and to make such improvements within six months after the date of approval of the Board's order by the Governor and the Attorney General.

THEREUPON, On motion duly seconded the report and findings of said State Board of Health were ordered transmitted to the Governor and the Attorney General for their action thereon.

I hereby certify that the foregoing reports and findings were duly made by the said State Board of Health of the State of Ohio, and that the proceedings above set forth were duly had before said Board as shown in the minutes thereof.

December 2, 1912.

E. F. McCAMPBELL,
Secretary of State Board of Health of the State of Ohio.

COLUMBUS, OHIO, December 21, 1912.

The foregoing reports and findings having been examined by us, respectively, the Governor of the State of Ohio, and the Attorney General of the State of Ohio, the same are in all respects approved this 21st day of December, 1912.

JUDSON HARMON,
Governor of Ohio.
TIMOTHY S. HOGAN,
Attorney General of Ohio.

AN ORDER ISSUED TO THE VILLAGE OF PLYMOUTH.

In 1911 an investigation of the existing water supply of Plymouth was made upon request of the health officer. After considering the report of its committee, the State Board of Health found that the water supply of Plymouth was impure and dangerous to health and the Board voted to require the village to purify the present water supply, or secure a new supply, satisfactory to the State Board of Health, within six months from the date of approval of the Board's order by the Governor and Attorney General.

The report and findings of the Board were submitted to the Governor and Attorney General for action thereon May 16th, 1911.

As the Bense law was in litigation the Attorney General advised that the matter be held until the final disposition of law by the Supreme Court. A report of the Board's investigation was published in the 1911 Annual Report.

October 28th, 1912, the law having been declared constitutional, the matter was again referred to the Attorney General and on November 13th the following order was signed by the Governor and Attorney General and sent to the mayor and council of Plymouth, November 14th:

ORDER OF THE STATE BOARD OF HEALTH TO THE VILLAGE OF PLYMOUTH.

WHEREAS, The State Board of Health of the State of Ohio having under consideration the conditions in the village of Plymouth, Richland County, Ohio, as set forth in the complaint, in writing, made to said State Board of Health by the health officer of the village of Plymouth, Richland County, Ohio, as required by Section 2 of an Act of the General Assembly of Ohio, entitled, "An Act to

authorize the State Board of Health to require the purification of sewage and public water supplies, and to protect streams against pollution", passed April 7th, 1908 (99 O. L. p. 74), did, in accordance with the duties imposed upon said Board by said act, pursue all and singular the requirements and duties to be performed by said State Board of Health, and having inquired into and investigated the conditions complained of in said complaint, and

WHEREAS, The State Board of Health, after investigating the conditions complained of, found that the public water supply of the village of Plymouth is impure and dangerous to health; and

WHEREAS, Acting pursuant to the requirements of the act aforesaid, said State Board of Health thereupon on the 7th day of December, 1910, notified the mayor and council of the village of Plymouth of its said findings, and gave the said village an opportunity through them to be heard on the 25th day of January, 1911; and

WHEREAS, On the 25th day of January, 1911, no representative from said village of Plymouth having appeared, a letter was presented from the village clerk, E. K. Trauger, stating that council waived its right to a hearing and that the village was about to take definite action toward securing a better water supply; further consideration of the matter was postponed by the State Board of Health; and

WHEREAS, On the 9th day of May, 1911, there appeared before the State Board of Health Mr. O. S. Earnest, mayor, and Mr. B. F. Long, village solicitor, and stated that the tax valuation was insufficient to raise the necessary amount of money to carry out the Board's instructions as regards the improvement of their public water supply, and requested the State Board of Health to issue an order under the Bense Act requiring such improvement to be made, thus enabling them to raise sufficient funds.

THEREUPON, After discussion and due consideration of said complaint, the State Board of Health found and determined that the improvements or changes in said conditions aforesaid are necessary and should be made, to-wit: That the village of Plymouth be required to purify the present water supply or secure a new water supply, satisfactory to the State Board of Health, within a period of six months from the date of the approval of the Board's order by the Governor and the Attorney General.

THEREUPON, On motion duly seconded, the report and findings of said State Board of Health were ordered transmitted to the Governor and the Attorney General for their action thereon.

I hereby certify that the foregoing report and findings were duly made by said State Board of Health of Ohio, and that the proceedings above set forth were duly had before said Board, as shown by the minutes thereof.

October 28th, 1912.

E. F. McCAMPBELL,
Secretary of State Board of Health of the State of Ohio.

COLUMBUS, OHIO, November 13th, 1912.

The foregoing report and findings having been examined by us, respectively, the Governor of the State of Ohio, and the Attorney General of the State of Ohio, the same are in all respects approved this 13th day of November, 1912.

JUDSON HARMON,
Governor of Ohio.

TIMOTHY S. HOGAN,
Attorney General of Ohio.

REPORT ON AN INVESTIGATION UNDER THE BENSE ACT
OF THE CONDITION OF THE SEWAGE PURIFICATION
PLANT AT SHELBY.

On July 9th, 1912, the following petition under the Bense Act was submitted to the State Board of Health:

"To the State Board of Health:

I, the undersigned, clerk of the board of health of the township of Cass, Richland County, State of Ohio, do hereby certify that the board of health of said township, being in session on the 22nd day of June 1912, adopted a resolution of which the following is a true copy.

Resolved, That the village of Shelby, located in Richland County, Ohio, is discharging and permitting to be discharged, sewage and other wastes into vats and filter beds, and by reason thereof has so contaminated said stream and the filter beds as to give rise to foul and noxious odors, thereby creating conditions that are detrimental to the health and comfort of the citizens of Cass Township, Richland County, Ohio, who reside in the vicinity of said nuisance.

That State Board of Health is hereby respectfully requested to investigate the conditions complained of, and to require the said village of Shelby, to install such works or means for purifying or otherwise disposing of its sewage and other wastes as may be determined by said board, in accordance with 'An Act to authorize the state board of health to require the purification of sewage and public water supplies and to protect streams against pollution,' passed April 7th, 1908.

(Signed.)

BOARD OF HEALTH,
T. A. BARNES, *Clerk,*
Shiloh, Ohio."

Dated at Shiloh, Ohio, this 2nd day of July, 1912.

At a meeting of the State Board of Health held July 19th, 1912, a committee, consisting of Mr. John W. Hill, engineering committee, and Mr. W. H. Dittoe, chief engineer, was appointed to investigate and report upon the complaint.

On August 21st, 1912, the Chief Engineer visited Shelby and made an examination of the sewage purification plant, accompanied by the complainants and representatives of the village of Shelby. The following report was submitted:

Shelby is located in Richland County on Black Fork Creek at the headwaters of the Muskingum River. Its population is approximately 5,000 and at the present time the growth is rather slow. In the way of public improvements the village is provided with a public water supply, installed in 1897, owned and operated by a private company; some twelve miles of paved streets; and a rather complete system of sanitary and storm sewers. The sanitary sewage is conveyed to a purification plant before its discharge into Black Fork Creek.

Description of Sewage Purification Plant. The sanitary sewers and storm drains were installed in the village during 1899 and 1900. In connection with the installation of the sewers, a sewage purification plant

was built at a point about three miles north of the village immediately west of the right-of-way of the Big Four Railroad and adjacent to Black Fork Creek. The sewage is conveyed to this point through an 18-inch trunk sewer.

The location of the plant is not unfavorable inasmuch as there are only a few dwellings within $\frac{1}{4}$ mile which might suffer from odors arising from the plant. There are, however, one or two farm houses within a few hundred feet of the plant, the owners of which suffer from the nuisance which is caused.

The plant comprises two small settling tanks, two large settling reservoirs, and two coarse grain filters. A manhole is located in the main trunk sewer just above its entrance to the plant by means of which the sewage flow may be diverted directly to the stream. The sewage before reaching the plant is passed through either or both of two so-called sludge basins, which in effect are small settling tanks to intercept the coarser suspended matters. These tanks are each 10 by 24 feet in plan, 6 feet 6 inches deep at the inlet end, and 5 feet deep at the outlet end. They are covered by means of hinged doors. The average capacity of each tank is 7,700 gallons, which represents a period of retention of 0.46 hour on the basis of the sewage flow of 400,000 gallons per day. The sewage from the settling tanks, one of which is out of commission at present, is conveyed through an open channel to the two reservoirs provided for subsidiary sedimentation. Before entrance into the first reservoir the sewage passes through a third so-called sludge basin designed to intercept the coarser solids. From this sludge basin the sewage flows over a weir into the first reservoir. The reservoirs are both constructed by excavation in the natural earth. The sides and bottoms are unlined. The first reservoir has an area of about 28,000 square feet and a depth of about 2 feet and an approximate capacity of 420,000 gallons. The other has an area of about 27,000 square feet and approximately 360,000 gallons capacity. The sewage passes in series through the two reservoirs before entering the filters. A connection is provided by means of which the contents of either reservoir may be discharged directly into Black Fork Creek. The reservoirs are connected by means of a 15-inch tile placed in the embankment which separates them.

The filters, which are provided for sewage purification, are 10,000 square feet and 15,000 square feet in area, respectively. The total area is, therefore, 0.57 acre, which is sufficient to provide a rate of 700,000 gallons per acre with a sewage flow of 400,000 gallons per day. The sewage flows continuously by gravity to either or both of the filters, there being no devices provided for distribution at the surface. The filtering material is composed of cinders and gravel with a total depth of 2 feet over the underdrains and 18 inches midway between them. The underdrains are connected to the main effluent drain before discharging into Black Fork Creek. Ventilators, consisting of 6-inch pipe, extend from

the ends of each underdrain to a point 6 inches above the surface of the filtering material.

Present Condition of Plant. The sewage flow at the time of the examination was estimated to be in the neighborhood of 400,000 gallons per day. It should be remarked that the flow is subject to wide variations and frequently reaches 600,000 gallons per day or more. The flow consisted of rather dilute sewage, although from its color it was evident that considerable quantities of acid iron wastes from the various manufacturing industries of the village were contained in the sewage.

The so-called sludge basins, or settling tanks, were found to be badly in need of cleaning as they contained a large quantity of sludge. The first reservoir and the secondary sludge pit at its inlet end were in a very offensive condition and evidently contained a large quantity of foul smelling sludge. The sewage in this reservoir was dark colored and in a state of putrefaction. The appearance of the second reservoir was somewhat improved, although large quantities of sludge deposits were found at the bottom and these were productive of very offensive odors at the time of the examination. A connection to the Black Fork Creek was open and a portion of the sewage flow was being by-passed in this manner with no treatment other than the plain sedimentation.

The filters were both found to be in an entirely unsatisfactory condition to produce any good results. The sewage was ponded to a depth of 6 inches or more over the surface of the filters and practically all the sewage was passing directly to the underdrains, reaching them by means of the ventilators. Therefore, the sewage discharged through the main effluent drain into the creek had received no purification other than sedimentation. The plant as a whole was in an extremely run down condition and evidences of neglect were apparent.

Black Fork Creek at the time of the examination was at medium stage and no decided nuisance in the stream was apparent. At low stages there is little doubt that the stream is badly polluted.

SUMMARY.

From the foregoing report it will be noted that the examination of the sewage purification plant at Shelby made August 21st, 1912, indicated that the plant is in an extremely run down condition and is entirely inadequate to serve the purpose for which it is intended. The plant is crude and antiquated and probably cannot be improved satisfactorily by attempting to repair the existing installation. It is apparent that the plant should be entirely abandoned and be replaced by a modern plant of a type representing the most recent practice of sewage purification.

RECOMMENDATIONS.

It is recommended that the Board declare that the existing sewage purification plant at Shelby is entirely unfit to treat the sewage from the

village, and at the present time is creating a decided nuisance. It is also recommended that the officials of the village of Shelby be cited to appear before the Board and show cause why extensive improvements in the disposal of sewage should not be made.

After giving the authorities of Shelby a hearing the Board adopted the report of its committee, and the following order was sent to the mayor and council of the village November 14th, 1912:

AN ORDER OF THE STATE BOARD OF HEALTH TO THE
VILLAGE OF SHELBY.

WHEREAS, The State Board of Health of the State of Ohio having under consideration the complaint against the village of Shelby, Richland County, Ohio, as set forth in writing, made to said State Board of Health by the trustees of Cass Township, Richland County, Ohio, as required by Section 1 of an Act of the General Assembly of Ohio, entitled, "An Act to authorize the State Board of Health to require the purification of sewage and public water supplies, and to protect streams against pollution," passed April 7th, 1908 (99 O. L. p. 74), did, in accordance with the duties imposed upon said Board by said act, pursue all and singular the requirements and duties to be performed by said State Board of Health, and having inquired into and investigated the conditions complained of in said complaint, and

WHEREAS, The State Board of Health, after investigating the conditions complained of found that the existing sewage purification plant of Shelby is entirely unfit to treat the sewage from the village and is, at the present time, creating a decided nuisance, and

WHEREAS, Acting pursuant to the requirements of the act aforesaid, said State Board of Health thereupon on the 13th day of September, 1912, notified the mayor and council of the village of Shelby, so causing the nuisance, of its said findings, and gave the said village an opportunity through them to be heard on the 23rd day of October, 1912, and

WHEREAS, On the 23rd day of October, 1912, pursuant to said notice there appeared before the State Board of Health Mr. B. F. Long, village solicitor, and Mr. A. Elliott Kimberly, consulting engineer, representing said village, and the matters as contained in said complaint were discussed with said Board, and

THEREUPON, After discussion and due consideration of said complaint, the State Board of Health found and determined that the following improvements and changes in said conditions aforesaid are necessary and should be made, to-wit: That the village of Shelby be required, within one year following the signing of the Board's order by the Governor and the Attorney General, to so reconstruct and enlarge its sewage purification plant as to provide adequate purification for the sewage of the village; and to present plans for such improvements to the State Board of Health for approval within three months following the approval of the Board's order by the Governor and the Attorney General.

THEREUPON, On motion duly seconded, the report and findings of said State Board of Health were ordered transmitted to the Governor and the Attorney General for their action thereon.

I hereby certify that the foregoing report and findings were duly made by

said State Board of Health of the State of Ohio, and that the proceedings above set forth were duly had before said Board, as shown by the minutes thereof.

October 28th, 1912.

E. F. McCAMPBELL,
Secretary of State Board of Health of the State of Ohio.

COLUMBUS, OHIO, November 13th, 1912.

The foregoing report and findings having been examined by us, respectively, the Governor of the State of Ohio, and the Attorney General of the State of Ohio, the same are in all respects approved this 13th day of November, 1912.

JUDSON HARMON,
Governor of Ohio.
TIMOTHY S. HOGAN,
Attorney General of Ohio

MISCELLANEOUS REPORTS

(603)

CESSPOOLS AND SEWAGE PURIFICATION PLANTS FOR PUBLIC BUILDINGS.

On May 31st, 1911, the General Assembly passed the Ohio State Building Code (Sections 12600-1 to 12600-283 of the General Code). Sections 12600-255 to 12600-263 of the Ohio Building Code designate at what location and in what manner cesspools may be constructed for public buildings and specify that in municipalities other than cities, cesspools may be used only after written permission has been secured from the Ohio State Board of Health.

Section 12600-264 provides that the plans and construction of sewage purifications plants for public buildings shall be approved by the Ohio State Board of Health.

Acting under the provisions of the foregoing sections, approvals of cesspools and sewage disposal plants have been granted for school buildings at Bettsville, Byesville, Mason, Ohio City, and South Euclid.

Bettsville.

On August 23rd, 1912, a general plan for proposed sewerage and cesspools for the disposal of the sewage from a new school house at Bettsville was received from Mr. S. H. Shively, architect for the board of education. One of the assistant engineers visited Bettsville on September 11th, 1912, and made an examination on the ground.

Bettsville, a village with a population of 500, is located in Seneca County on the watershed of the Sandusky River. The village has no sewers, hence the necessity of installing cesspools for the school building. The new school will accommodate 125 pupils and will be provided with modern plumbing facilities.

The plan provides for the location of a watertight and a leaching cesspool about 130 feet north of the school building. There are several wells within 300 feet of this distance. The design of the cesspools is unsatisfactory as they are of insufficient size to accommodate the population tributary.

Action. On October 12th, 1912, plans and specifications for proposed cesspools for a new school building at Bettsville, submitted August 23rd, 1912, by Mr. S. H. Shively, architect for the board of education, were disapproved by the Chief Engineer. The board of education was advised that the general procedure of installing a watertight cesspool and leaching cesspool in accordance with the provisions of the building code was approved provided:

- 1st. That the leaching cesspool be located at least 300 feet northwest or east of the school building;

2nd. That the capacity of each cesspool be increased to at least 4,000 gallons.

3rd. That no outlets connecting the cesspools with a drain or water-course be used.

4th. That the installaton be removed whenever a sanitary sewer shall have become available for the removal of sewage; and,

5th. That revised plans showing the location and design of the cesspools be submitted to this department.

At a meeting of the State Board of Health held November 21st, 1912, the foregoing action of the Chief Engineer was confirmed by the Board.

Byesville.

On September 9th and 12th, 1912, The Orr Plumbing Company of Cambridge, acting for the board of education of Byesville, submitted plans and specifications for a sewage purification plant for a school building at Byesville. The plans and specifications were examined in the engineering department.

Byesville is a village with a population of 3,156, located on Wills Creek, about four and one-half miles south of Cambridge. The village is unprovided with sewerage facilities, and as Wills Creek is used as a source of public water supply for Cambridge, it is important that no untreated sewage be discharged into the stream. It was, therefore, necessary to provide an efficient method of treatment of the sewage.

The school building will accommodate 420 pupils and will be provided with indoor plumbing facilities. Owing to the proximity of the school to dwellings and the absence of sanitary sewers it became necessary to provide a plant placed entirely underground.

The purification plant comprises a septic tank and continuous sand filters. The septic tank is a concrete structure with a capacity of 1,850 gallons which furnishes 8.6 hours retention, assuming a sewage flow of 1,500 gallons taking place during seven hours. The filter has an area of 153 square feet, which provides a rate of filtration of about 435,000 gallons per acre per day. In view of the intermittency of operation this high rate will probably not cause trouble if the operation of the plant is carefully attended to. The septic tank is covered with a concrete roof and the filter with wooden hinged doors which provide access to the filter. The outlet to the filter will discharge into a storm sewer emptying into Wills Creek.

Action. On September 12th, 1912, plans and specifications for a sewage purification plant for a school building at Byesville, submitted September 9th and 12th, 1912, by The Orr Plumbing Company of Cambridge for the board of education of Byesville, were approved subject to the following conditions:

1st. That the plant be altered, repaired, or enlarged when in the

opinion of the State Board of Health, such alteration, repair, or enlargement shall be deemed necessary;

2nd. That the plant be abandoned and removed whenever a sanitary sewer shall have become available for the removal of the sewage from the school building;

3rd. That samples of filtering material be submitted to and approved by the Engineer of the State Board of Health before being placed;

4th. That the sludge be removed from the septic tank at intervals not greater than one month during the school year; and,

5th. That a competent man be detailed to attend to the operation of the plant whose duties shall include an inspection of the plant at intervals not greater than one week and cleaning of the filters when necessary.

The Board of Education was advised that in the construction of the plant the inlet to the septic tank be placed in the wall opposite the outlet end, and that the surface of the filtering material be at the same elevation as the invert of the distributing tile.

At a meeting of the State Board of Health held October 23rd, 1912, the foregoing action of the Chief Engineer was confirmed by the Board.

Mason.

On November 9th, 1912, Mr. W. N. Cox, Clerk of the board of education of Mason, submitted plans and specifications for a proposed sewage purification plant for a high school building at Mason. The plans and specifications were examined by the engineering department.

Mason is a village with a population of about 900, located in Warren County on Muddy Creek, a tributary of the Little Miami River. The village is without sewers and has no other municipal improvements.

The new school building will accommodate 200 pupils and will be equipped with modern plumbing conveniences. The discharge of sewage untreated into a small run near the building would create a decided nuisance within the village limits. It was, therefore, necessary to provide means of suitable treatment of the sewage.

The plans for the purification plant provide for a septic tank, dosing tank, and intermittent sand filters. The septic tank and dosing tank are combined in one structure and are covered with a concrete or stone roof. The septic tank has a capacity of 2,500 gallons, which provides approximately one day's retention of the sewage. The dosing tank has a capacity of 500 gallons, which will provide for five discharges per 24 hours. The effluent from the filters will be carried into a small run passing through the northerly portion of the village.

Action. On November 16th, 1912, the plans and specifications for a proposed sewage treatment plant for the high school building at Mason,

submitted by Mr. W. N. Cox, November 9th, 1912, were approved by the Chief Engineer subject to the following conditions:

1st. That the plant be abandoned and removed whenever a sanitary sewer shall become available for the removal of the sewage from the school building;

2nd. That a caretaker be employed to attend to the operation of the plant and keep it in proper working condition;

3rd. That the sludge be removed from the septic tank at intervals not greater than two months during the school year; and,

4th. That this approval shall be void unless the plant shall have been constructed prior to September 1, 1913.

The clerk of the board of education was advised that a sample of the filtering material for the intermittent filters, submitted by him previously, had been physically examined and found to be satisfactory, provided that it first be passed through a $\frac{1}{4}$ -inch screen and the tailings discarded. He was advised that the tailings could be used as gravel surrounding the underdrains.

At a meeting of the State Board of Health held January 22nd, 1913, the foregoing action of the Chief Engineer was confirmed by the Board.

Ohio City.

On June 21st, 1912, plans and specifications for a proposed sewage purification plant for a high school building at Ohio City were submitted by Mr. W. A. Baker of The American Warming & Ventilating Company of Toledo, engineers for the board of education. On June 7th, 1912, in anticipation of the submission of the plans the engineering assistant visited Ohio City and made an examination on the ground.

Ohio City is a village with a population of 860 and has no municipal improvements. The school building, which is an old one, has an enrollment of 340 pupils. It is planned to improve the building and to provide modern plumbing conveniences. In the absence of sanitary sewerage facilities, it is necessary to provide a suitable purification plant for the sewage before the effluent can be safely discharged.

The purification plant is designed on the basis of a daily flow of sewage of 1500 gallons. The plant will comprise a septic tank and continuous sand filters. The septic tank will be of concrete covered tightly and will have a capacity of 1,600 gallons, providing approximately one day's retention. The sand filters will have an area of 180 square feet providing a rate of 3600 gallons per acre per day and a population load of 4,000 per acre. The filter will be covered with an earth fill to a depth of 3 feet to avoid the production of a nuisance. The effluent from the filter will be carried through a drain to a 10-inch storm sewer which empties into a small stream about three-fourths of a mile northeast of the school building.

Action. On June 25th, 1912, plans and specifications for a proposed sewage purification plant for a high school building at Ohio City, submitted by Mr. W. A. Baker of The American Warming and Ventilating Company of Toledo, on June 21st, 1912, were approved by the Chief Engineer subject to the following conditions:

1st. That the plant be abandoned and removed whenever a sanitary sewer shall become available for the removal of the sewage from the school building.

2nd. That samples of the filtering material be submitted to and approved by the Engineer of the State Board of Health before being placed.

3rd. That ventilation of the septic tank and filter be provided.

4th. That a course of gravel be placed immediately surrounding both the distributing tiles and the underdrains.

5th. That the sludge be removed from the septic tank at intervals not greater than one month during the school year.

At a meeting of the State Board of Health, July 18th, 1912, the foregoing action of the Chief Engineer was confirmed by the Board.

SOUTH EUCLID.

On December 9th, 1912, plans and specifications for proposed sewerage and septic tank for a township school house at South Euclid were submitted by Mr. Joseph A. Morlock, member of the board of education. On December 21st, 1912, the principal assistant engineer visited South Euclid for the purpose of making an examination on the ground.

South Euclid is an unincorporated community with a population of 310, located in Cuyahoga County twelve miles east of the center of the city of Cleveland. The village has no public improvements. A new school building has recently been constructed to accommodate 150 pupils and it is at present proposed to install modern plumbing facilities in the building. It is estimated that the sewage flow from the building will amount to 2250 gallons per day.

The plans provide for the installation of a septic tank, the effluent from which is to be carried about one-half mile to an outlet into a small tributary of Euclid Creek, a stream which flows in a northerly direction into Lake Erie. The capacity of the septic tank is 3150 gallons, equivalent to about 10 hours' storage on the basis of 2,250 gallons sewage flow occurring in 7 hours. No provision is made for cleaning the tank and no outlets are shown to provide for its drainage. A small stream into which it is proposed to discharge the effluent is merely a wet weather ditch which has no flow during summer months.

Action. On December 28th, 1912, plans and specifications for a proposed sewerage and septic tank for a township school house at South Euclid, submitted by Mr. Joseph A. Morlock, member of the board of

education, on December 9th, 1912, were disapproved by the Chief Engineer. The Board of Education was advised that the plans do not provide a proper method of treatment of the sewage, and that revised plans for a more suitable type of plant giving a high degree of purification should be prepared.

At a meeting of the State Board of Health held January 22nd, 1913, the foregoing action of the Chief Engineer was confirmed by the Board.

REPORT ON THE PUBLIC WATER SUPPLY OF CLEVELAND WITH REFERENCE TO THE TREATMENT WITH CALCIUM HYPOCHLORITE.

On December 15th, 1911, the following resolution adopted by the council of the city of Cleveland on December 11th, 1911, was received from Mr. R. Y. McCray, city clerk.

"WHEREAS, by the use of chlorine in the city water many complaints have been received from citizens of Cleveland to the effect that chlorine is both detrimental to health and obnoxious to the taste; and

WHEREAS, in view of the fact that there is a difference of opinion among the medical fraternity as to the effects of chlorine when used in drinking water; now, therefore,

Be it resolved by the council of the city of Cleveland, state of Ohio, that the clerk of this council be and he is hereby instructed to refer a copy of this resolution to the State Board of Health, asking them to investigate and report to this council their opinion as to whether the city is following the proper course in the treating of water with chlorine."

On December 13th, 1911, a communication was received from Mr. J. H. Stanberger, health officer of East Cleveland, which city receives its water supply from Cleveland, requesting an investigation by the State Board of Health of the treatment of the water supply of Cleveland with calcium hypochlorite. On December 16th, 1911, a complaint was received against the treatment of the water supply from Mr. L. E. Billson, a citizen of Cleveland.

On December 15th, 1911, the president of the Board appointed the following committee to make an investigation and report:

Mr. W. H. Dittoe, Acting Chief Engineer,
Mr. John W. Hill, Engineering Committee.
Dr. William T. Miller, Member,
Dr. Frank Warner, President.

On January 5th and 6th, 1912, the acting chief engineer visited Cleveland and made a general examination of the water supply and of the treatment with hypochlorite. During the week of January 8th, 1912, one of the engineering assistants visited Cleveland and conducted a detailed examination of the treatment of the water supply. The following report was submitted:

Cleveland is situated in the northeastern portion of the state on Lake Erie at the mouth of the Cuyahoga River. The estimated present population of the city itself is 600,000, and including adjacent communities it forms a center of population of about 650,000. The growth of the city has been very flourishing during the past few decades and it appears that this growth will continue in the future.

The main portion of the city lies on a level plateau which extends along the lake front at an average elevation of 80 feet above lake level. The outlying portions of the city, however, are situated on higher ground. Back of the plateau the surrounding country rises with a gentle slope, reaching an elevation of 300 feet above the lake level. The plateau is deeply bisected by the valley of the Cuyahoga River, which passes through the central portion of the city. This river has a very sluggish flow and its ordinary level is but slightly above that of Lake Erie along its course from the northern portion of Summit County to its mouth. Throughout this length its ancient shale bottom is far below the surface of the lake and is now covered by alluvium which has a thickness of about 200 feet.

The underlying geological formation at Cleveland is the Erie shale, and this is covered by drift deposits reaching a thickness of 300 feet or more.

The public water supply is obtained from Lake Erie through a crib located four miles from the shore opposite the mouth of the Cuyahoga River. Until recently the water has been pumped in its raw state into the distribution system. As will be described in detail in a later portion of this report, there was installed during the fall of 1911 a temporary plant for the treatment of the public water supply with hypochlorite. The sewerage of the city has been constructed principally on the combined plan. The sewage was originally discharged through numerous outlets into the Cuyahoga River and into Lake Erie. In 1896 the Board approved a system of intercepting sewers providing for the discharge of the dry weather flow into Lake Erie at Collinwood. This system has been partially constructed and the outlet has been established at a point 7.5 miles east of the mouth of the Cuyahoga River, through which about fifty per cent of the dry weather flow is discharged. A temporary outlet is also located about one mile west of the mouth of the Cuyahoga River, which serves that portion of the intercepting sewer which has been constructed in the western portion of the city. Along the course of the completed portion of the intercepting sewer there are seventeen storm water overflows into the lake. Aside from these outlets, sewage is discharged into the Cuyahoga River at twenty-one combined sewer outlets; and into Big Creek, a tributary of the Cuyahoga River, at one outlet. Considering the sluggish flow of the Cuyahoga River, as has been described, the seriousness of the discharge of a large volume of sewage into the stream will be recognized. High stages of the stream

are accompanied by a discharge of accumulated deposits into the lake, and thus the water supply is contaminated.

HISTORICAL.

The public water supply of the city of Cleveland was installed in 1853, at which time an intake was located a few hundred feet from the shore and about one-half mile west of the mouth of the Cuyahoga River. In 1857, owing to the influence of the river discharge upon the water supply, a new intake crib was proposed and it was ultimately constructed one and one-third miles from the shore and one mile west of the river. In 1896 work was begun on the intake crib which is at present used. This crib was placed four miles from the shore and directly opposite the mouth of the Cuyahoga River. The crib is commonly known as the Five Mile Crib, since the 9-foot tunnel which connects it with the Kirtland Street pumping station is five miles in length. This new intake was placed in service in April 1904, and since that time the entire supply has been furnished by this means, the old crib having been abandoned.

It is now proposed to establish a new crib some 3,600 feet west of the present intake by extending a conduit from the old abandoned crib some 16,000 feet farther into the lake. In this improvement will also be included the construction of a new pumping station.

PRESENT SUPPLY.

As has been stated, the water supply is at present taken from Lake Erie through a crib four miles from the shore opposite the mouth of the Cuyahoga River. The water is conveyed to the pumping station through a 9-foot tunnel having a total length of five miles. The pumping station is located in the easterly portion of the city at the shore of the lake.

Of special interest regarding the hypochlorite treatment is the method of supplying the water to the consumer. The main portion of the city, below an elevation of about 280 feet above the lake, is supplied by direct pressure from the Kirtland Street pumping station. This is known as the low service district. An independent main, 48 inches in diameter, supplies the western portion of this district and extends from the Kirtland Street station to the Division Street pumping station before any branches or services are connected with it. That portion of the city which lies at an elevation higher than 280 feet above the lake level is included in the so-called first and second high service districts. The water from the pumps at the Kirtland Street station in excess of that used for the low service, is received in the Fairmount reservoir located in the easterly portion of the city, which acts as an equalizer for the low service district. This reservoir is uncovered, has an area of about twelve acres, and with twenty feet of water has a capacity of 80,000,000 gallons. The sides are paved with stone blocks on puddled clay. No surface

drainage has access to it. The Fairmount pumping station is located near the reservoir and contains three pumping engines, one of which is used to supply the first high service district. At a high point within the city of Newburg the Kinsman reservoir is placed for storage and equalization of pressure for the first high service district. This reservoir is of the same construction as the Fairmount reservoir and has a capacity of 37,000,000 gallons. At the Fairmount pumping station water is also pumped for the second high service district, which includes the highest portions of the city and surrounding communities. A standpipe is provided on this system for storage and equalized pressure.

It will be seen therefore, that the water supplied to the first and second high service districts receives a period of storage in the reservoirs before reaching the consumer. Owing to the fact that water is drawn from the Fairmount reservoir for the high service districts, the low service district is constantly supplied by direct pumping, the reservoir acting simply as an equalizer and not as a supply for the district. This method of handling the supply for the various portions of the city is important as regards the effect upon the water of treatment with hypochlorite.

Quality of Public Water Supply. The quality of the public water supply of Cleveland as taken from Lake Erie has not been extensively studied by the State Board of Health. The principal information available regarding the quality of the supply is that obtained by the examinations of the city bacteriologist, and that contained in a report of Mr. George C. Whipple, consulting engineer, on the quality of the water supply of Cleveland, submitted in 1905.

Daily samples of the water supply have been examined by the city bacteriologist for a number of years. These examinations indicate that prior to the establishment of the Five Mile Crib the quality of the supply was unsatisfactory, and the pollution by the sewage of Cleveland was shown. Since 1905 the examinations have shown a marked improvement in the supply. During successive years since 1905, however, the examinations have indicated an increase in the pollution of the supply, which fact is shown by the increasing percentage of positive tests for intestinal organisms.

Mr. Whipple's study of the quality of the water supply was carried on during 1904. A large number of samples were collected from Lake Erie at a number of points and various other studies were made with a view to determining the influence affecting the quality of the supply. The general results of the study indicate that the water from Lake Erie obtained from the old crib was at times seriously polluted and was dangerous as a source of supply. It was also concluded that at the time of the studies the water from the new crib was reasonably safe from a sanitary standpoint. It was pointed out, however, that this supply was occasionally mildly polluted by the sewage from the city as well as by

other local polluting influences. It was also pointed out that although at that time filtration of the supply was not demanded, the increasing pollution would before many years necessitate filtration.

The available typhoid fever and vital statistics for Cleveland perhaps furnish the best index of the quality of the water supply. These statistics are available in more or less complete form from 1873 to date. The records show that from 1873 to 1904 inclusive, the average annual death rate per 100,000 was 1,637, and the average typhoid fever death rate was 52. Since 1905 a decrease is shown in both total and typhoid fever death rates. For the years 1905 to 1910 inclusive the average total death rate has been 1,442, and for the years 1905 to 1911 inclusive the average typhoid death rate has been 15.4. These figures strikingly indicate the improvement in health conditions brought about by the installation of the Five Mile Crib.

A particular study of the typhoid fever statistics furnishes interesting results. Statistical investigations by Sedgwick and Winslow in 1902 indicated that in cities having unpolluted water supplies the mortality from typhoid fever corresponded with remarkable regularity to the temperature changes throughout the year. On the other hand, the statistics gathered by them indicated no agreement between mortality from typhoid fever and temperature in cities having more or less polluted water supplies. Applying this method of study to Cleveland, diagrams have been drawn from averages covering a period of six years previous to 1905, during which the old waterworks crib was used, and for the period from 1905 to 1911, during which the Five Mile Crib has been used. Reasoning from analogy to the results of Sedgwick and Winslow, these diagrams indicate that the water supply was polluted previous to 1905, and that the supply from the Five Mile Crib is during a large portion of the year free from injurious pollution. Variations from parallelism between typhoid fever mortality and temperature in the spring indicate the occasional pollution of the present supply.

The typhoid fever statistics since 1905 may be taken as an indication of the quality of the supply. During this period the average annual death rate from typhoid fever for 100,000 population has been 15.4, and during no year has the rate exceeded 19. The average rate of cases for the same period has been 90, and the maximum rate 117. The monthly variation in the occurrence of cases and deaths from typhoid fever is not great, and no epidemic conditions are indicated. During each year, 1905 to date, the rates of cases and deaths have been in excess of the annual average rates during the late summer and early fall months. During other portions of the years there have been no great variations in the rates of cases and deaths. These statistics would indicate that the typhoid fever prevalence at Cleveland is largely due to causes other than the water supply. There is no doubt that a portion of the typhoid fever should be attributed to the water supply as indicated

by minor increases in the number of cases in the winter and early spring months.

A thorough study of typhoid conditions within the city should be conducted by the city health department with a view to ascertaining accurately the sources of infection. Such a study should recognize the prevalence of typhoid fever in cities along Lake Erie west of Cleveland and on the Cuyahoga River watershed as well as that within the city of Cleveland.

Description of Hypochlorite Treatment. Until recently no steps have been taken by the city to purify the water supply. In September 1911, however, following a preliminary investigation, the city board of health recommended the use of calcium hypochlorite as a method of purification. The experimental work was carried on by Dr. Roger G. Perkins of Western Reserve University, who recommended as a result of his studies the use of bleaching powder in an amount equivalent to the application of 0.7 part per million available chlorine, corresponding to the use of approximately 17.5 pounds of bleaching powder.

The hypochlorite plant was installed by the waterworks department and placed in service September 11th, 1911. The plant consists of a mixing tank for dissolving the bleaching powder, two solution tanks of 5,800 gallons' capacity each for the storage of the solution, and an orifice tank for the application of the solution to the water supply. The powder is dissolved in a proportion to give a one per cent solution (one pound bleaching powder to 100 pounds of water), and this solution is applied to the water supply in the intake tunnel just before it reaches the pumps at the Kirtland Street station. No means for agitation of the water or storage after its treatment before it is pumped into the mains is provided to secure complete dispersion of the solution. The agitation which is created by pumping, check valves, etc., may, however, assist in securing good dispersion.

The amount of bleaching powder used and the method employed in its application are of particular importance. During the period from October 12th to January 6th. the average daily pumpage was 64.7 million gallons, and the average amount of bleaching powder used daily was 1,380 pounds. This corresponds to an average of 21.3 pounds per million gallons, or assuming 35 per cent available chlorine in the powder, .895 part per million. The maximum application during this period was 30.0 pounds per million gallons, while the minimum application was 13.1 pounds. During the three days of sampling, January 8th, 9th and 10th, accurate records were obtained showing the fluctuations in pumpage and the application of hypochlorite at fifteen minute intervals. The records during these three days indicate that an average of 18 pounds per million gallons or .756 part available chlorine per million were applied to the water. Fluctuations in the rate of application of the chemical took place whenever one of the pumps at the stations was stopped or started,

and the maximum application for the period was 1.39 parts available per million extending over a period of 30 minutes. On one occasion the rate was in excess of one part per million for a period of two hours. On the whole the records obtained during these three days indicated a fair regularity in the application of the chemical, and with greater care the treatment could be regulated to meet the fluctuations in pumpage caused by the starting and stopping of pumps.

Effect of Treatment upon Public Water Supply. The treatment of the public water supply with hypochlorite during the time it has been used has accomplished some reduction in typhoid fever. In the accompanying table is presented a comparison of the average annual rates per 100,000 population of cases and deaths for the months of September, October, November, and December for the periods 1901 to 1904, 1905 to 1910, and for 1911. During 1901 to 1904 the old crib was used as a source of supply. During 1905 to 1910 the Five Mile Crib was used, the water being pumped without treatment. During 1911 hypochlorite was employed. It will be noted that high death rates occurred during the period 1901 to 1904, and that a reduction took place during the period 1905 to 1910. A further reduction was also accomplished in 1911, during which hypochlorite was used. This reduction is more noticeable when it is taken into account that during September 1911, a very high rate of cases and deaths prevailed, being followed by a reduction in the successive months.

TYPHOID FEVER CASES AND DEATHS.

Rates per 100,000 population per annum.

	September.		October.		November.		December.	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
1905	165	18	109	20	68	15	43	10
1906	210	44	132	32	76	17	66	20
1907	286	17	251	38	140	24	52	5
1908	151	11	230	27	96	25	98	16
1909	214	22	172	15	53	15	79	20
1910	263	32	220	30	103	26	88	21
Average—								
1905-1910	215	24	186	27	89	20	71	15
1911	329	39	116	17	74	17	37	4
1901-1904	209	48	119	36	87	29	152	35

The study conducted at Cleveland January 8th to 12th, consisted principally in examinations of the water after treatment. The bacterial results of samples collected at widely separated points throughout the city showed the entire absence of intestinal organisms and no high total

counts were observed. The results as a whole show that the treated supply was entirely safe as regards the production of typhoid fever.

Examinations were also made to learn the physical and chemical effect upon the water by the application of the hypochlorite. The analytical results showed the presence of free chlorine in 80 per cent of the samples collected on the distribution system. The only samples which did not show a presence of free chlorine were taken from two points far removed from the Kirtland Street pumping station, one being on the low service district in East Cleveland, a city adjoining Cleveland at its easterly corporation line, and the other from a tap on the first high service district. The absence of free chlorine in every sample collected at these points may be explained by the storage which the water receives before reaching the point of sampling.

Some study has been made by the waterworks department of the effect of the hypochlorite treatment, and for this purpose samples were taken at various points along the 48-inch main which leads from the Kirtland Street pumping station to the western portion of the city. These samples were collected on October 2nd. The following table illustrates the results and shows the quantity of unused or free chlorine left in the supply.

RESULTS OF ANALYSES OF WATER TREATED WITH CALCIUM HYPOCHLORITE.

Time P. M.		Parts Available Chlorine per Million.	Time Elapsed Since Treat- ment.
2:50	Kirtland Station discharge of holly engine No. 3.....	.86	0
3:00	East 49th St. and Lakeside Ave.....	.80	4 min. 32 sec.
3:10	East 40th St. and Hamilton.....	.76	15 min. 33 sec.
3:15	East 30th St. and Hamilton.....	.69	26 min. 43 sec.
3:29	East 23rd St. and Lakeside Ave.....	.59	34 min. 10 sec.
3:35	East 17th St. and Lakeside Ave.....	.58	42 min. 19 sec.
3:43	East 9th St. and Lakeside Ave.....	.55	52 min. 19 sec.
3:48	Ontario St. and Lakeside Ave.....	.55	59 min. 43 sec.
3:55	West 9th St. and Lakeside Ave.....	.62	1 hr. 6 min. 29 sec.
4:20	Spruce St. and Riverbed.....	.55	1 hr. 17 min. 41 sec.
4:28	Spruce St. and Center.....	.47	1 hr. 22 min. 7 sec.
4:35	Division St. and Center 26th St.....	.40	1 hr. 26 min. 46 sec.
4:47	Division Ave. Station.....	.40	1 hr. 34 min. 30 sec.

It is of interest to note that with 0.86 part available chlorine at the pumping station, almost half of this amount is left in the water one and one-half hours after treatment. The stratification in the mains and the absence of mixing facilities may account largely for this amount of

residual chlorine. The amount used at the Division Avenue station is as great as is used in the disinfection of the water supplies of many cities.

Some recognition must be given to the possibility of producing a toxic effect in the water supply by the use of hypochlorite, especially in excessive quantities. It is claimed by some authorities that no toxic effect is produced, but it appears that this conclusion has been reached without extensive study. The State Board of Health is contemplating an exhaustive investigation of the effect of the use of the chemical but at the present time no statement can be made regarding the toxicity of chlorinated water.

CONCLUSIONS.

1. A study of available data and statistics regarding the public water supply of Cleveland as obtained from the Five Mile Crib, indicates that under normal conditions the supply is not dangerously contaminated by the sewage from the city; but that the supply is occasionally subject to that polluting influence.
2. The treatment of the water supply with calcium hypochlorite September 11th to February 6th, has effectually destroyed the intestinal disease producing organisms present in the supply as drawn from the lake; and has caused a reduction in the prevalence of typhoid fever.
3. The quantity of calcium hypochlorite used in the treatment September 11th to February 6th, was excessive.
4. No statement is made regarding the toxic effect of excessive use of calcium hypochlorite in the treatment of water supplies.

RECOMMENDATIONS.

It is recommended that the Board hold in abeyance approval of the use of hypochlorite in the treatment of the public water supply of Cleveland.

It is also recommended that the city be furnished a copy of this report and be advised of the following facts and opinions:

1. That the quantities of hypochlorite used September 11th to February 6th, are excessive.
2. That tests conducted January 8th to 12th, 1912, indicate that a residual amount of unused chemical is present in the water supplied to consumers over a large percentage of the area of the city.
3. That the present knowledge of the toxic effect of this excessive treatment is limited; and that the State Board of Health is now contemplating a study of this effect, the results of which study will be made public at a later date.
4. That it is the opinion of the State Board of Health that satisfactory results as regards the destruction of pathogenic bacteria could be obtained, during normal meteorological conditions at least, with the use of a quantity of hypochlorite very much less than that employed September 11th, 1911, to February 6th, 1912.

5. That the State Board of Health would advise a thorough study by the city of typhoid fever conditions within the city with a view of learning the exact sources of infection.

6. That further investigation of the treatment of the water supply of Cleveland will be made by the State Board of Health, and with this in view the following data should be obtained and furnished to the State Board of Health at weekly intervals:

a. Daily bacteriological and chemical examinations of the water supply before and after treatment.

b. Daily pumpage and amount of chemical used.

VITAL STATISTICS FOR CLEVELAND.

1873-1911.

Year.	Population.	Total Deaths.	Rate per 100,000	Typhoid Deaths.	Rate per 100,000
1873	113,000	2,641	2,337	68	60
1874	120,000	2,190	1,824	81	68
1875	127,000	2,962	1,742	65	51
1876	133,000			65	49
1877	140,000	2,903	2,075	82	59
1878	147,000	2,710	1,840	55	38
1879	153,000	3,038	1,985	46	30
1880	160,000	3,156	1,970	70	44
1881	170,000	3,727	2,195	169	99
1882	180,000	3,156	1,752	122	68
1883	190,000	3,399	1,790	123	65
1884	200,000	3,732	1,615	121	60
1885	211,000	3,574	1,698	71	34
1886	221,000	3,525	1,595	113	56
1887	231,000	4,139	1,790	120	52
1888	241,000	4,414	1,830	113	47
1889	251,000	4,414	1,757	172	75
1890	261,000	4,888	1,872	181	69
1891	273,000	5,169	1,892	156	57
1892	285,000	5,227	1,837	144	60
1893	297,000	5,124	1,720	153	52
1894	309,000	5,545	1,790	89	29
1895	322,000	5,167	1,605	117	36
1896	334,000	4,859	1,455	143	43
1897	346,000	4,947	1,429	79	23
1898	358,000	5,007	1,395	106	30
1899	370,000	5,488	1,480	118	32
1900	382,000	6,017	1,575	205	54
1901	400,000	5,730	1,435	140	35
1902	418,000	6,134	1,470	133	32
1903	436,000	6,799	1,560	472	108
1904	454,000	6,476	1,425	216	47
1905	472,000	6,424	1,360	67	14
1906	489,000	7,353	1,505	93	19
1907	507,000	7,678	1,515	84	17
1908	525,000	7,177	1,370	64	12
1909	543,000	7,915	1,460	67	12
1910	561,000	8,092	1,442	105	19
1911	580,000			85	15

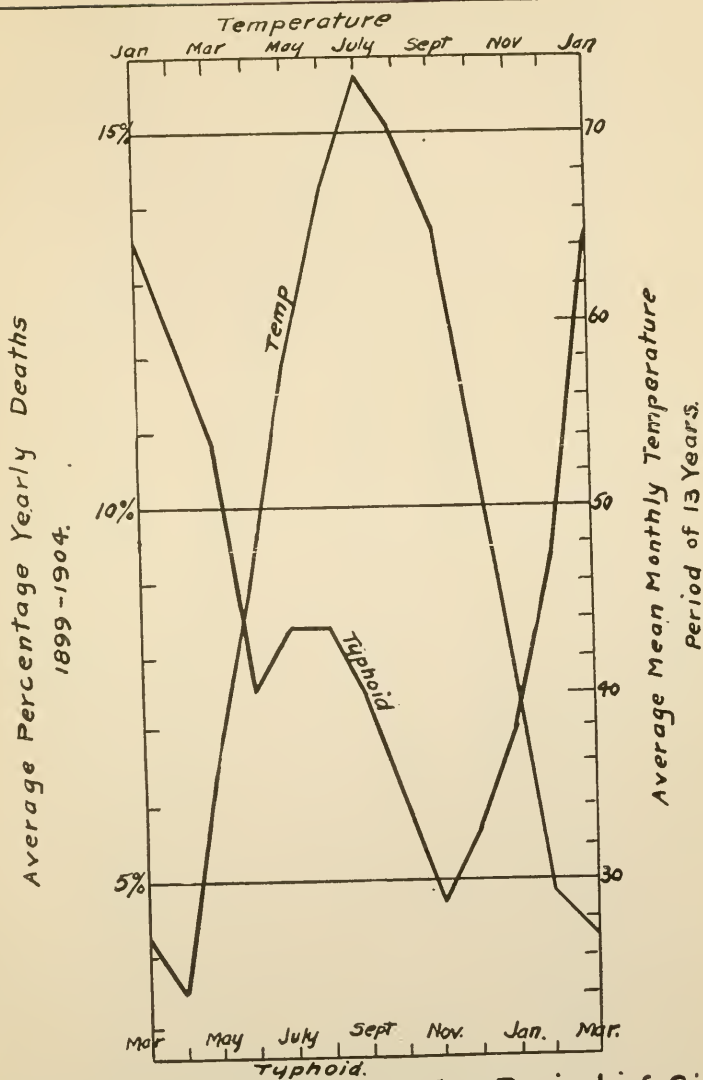
CLEVELAND.

TABLE SHOWING THE AVERAGE NUMBER OF TYPHOID DEATHS FOR THE SIX-YEAR PERIOD BETWEEN 1899 AND 1904, AND FOR THE SEVEN-YEAR PERIOD BETWEEN 1905 AND 1911.

Month.	Average Deaths, 1899-1904.	Average Deaths, 1905-1911.	Average Tem- perature for 13-year Period (deg. F.)
January	15	7	27.4
February	20	5	24.2
March	29	4	37.0
April	26	6	45.9
May	23	6	58.3
June	16	5	67.2
July	18	5	72.8
August	18	6	70.3
September	16	12	64.7
October	13	11	53.0
November	10	9	41.0
December	12	6	29.1
Total	214	81	

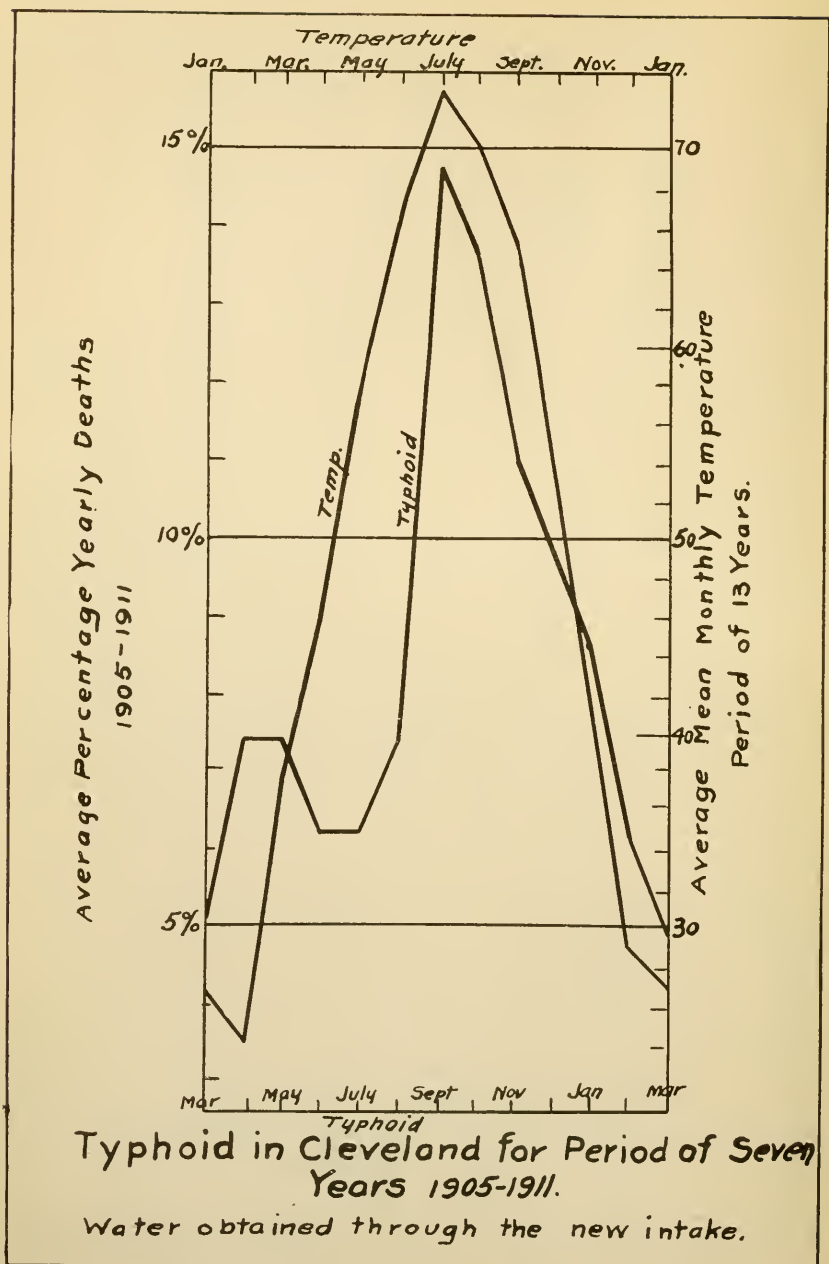
TABLE SHOWING THE PERCENTAGE OF THE AVERAGE MONTHLY TYPHOID DEATHS TO THE AVERAGE YEARLY DEATHS FOR THE SAME PERIODS AS GIVEN IN THE PRECEDING TABLE.

Month.	Percentage Monthly Deaths to Aver- age Yearly Deaths (per cent.)	Percentage Monthly Deaths to Aver- age Yearly Deaths (per cent.)
January	7.00	8.60
February	9.35	6.20
March	13.55	4.93
April	12.10	7.39
May	10.75	7.39
June	7.48	6.20
July	8.40	6.20
August	8.40	7.40
September	7.50	14.80
October	6.10	13.58
November	4.70	11.10
December	5.62	7.40



Typhoid in Cleveland for Period of Six Years 1899-1904.

Water obtained through the old intake.



INFORMAL REPORT ON SANITARY SURVEY OF LAKE ERIE
AT CLEVELAND.

On November 9th to 28th, 1911, inclusive, one of the engineering assistants visited Cleveland in order to collect samples of water from the Cuyahoga River and Lake Erie for the purpose of ascertaining the quality of the Cleveland water supply and the effects of sewage discharged by the city either directly or through the Cuyahoga River, upon the water of the lake near Cleveland. The city engineering department co-operated with the State Board of Health to the extent of furnishing a boat and men from the department to assist in the collection of samples. The field chemical and bacteriological work was conducted in one of the biological laboratories of the Western Reserve Medical College. The following informal report was submitted:

Through the activities of the Cleveland Health department the Cleveland water supply has been treated, since September 11th, 1911, with hypochlorite of lime, in order to safeguard the city against the ravages of typhoid fever. The agitation of the public water supply question at this time gained ground rapidly, and a permanent purification plant for the purification of the public water supply seems to be assured. Before such an installation, however, an expert examination and report is to be made as to the best method of handling and purifying the supply.

Historical. The first general use of lake water by the city of Cleveland dates back to 1853, at which time an intake was placed a few hundred feet from shore and about one-half mile west of the mouth of the Cuyahoga River. (See Bulletin No. 77, Public Health and Marine Hospital Service, p. 135.) In 1857, owing to the pollution of the Cuyahoga River by oil refinery wastes and an ultimate pollution of the lake near the intake, a new intake crib was proposed, which was ultimately located one and one-third miles from shore and one mile west of the river. Two tunnels were constructed, one 5 feet in diameter in 1874, and the other 7 feet in diameter in 1891, to bring the water to the Division Street pumping station. The water flowed through these tunnels to a large aqueduct, which supplied the various pump wells. From these wells the water was pumped to the Fairmount reservoir for the low service, and repumped from there to the Kinsman reservoir for high service. (See State Board of Health report, 1898, p. 548.)

In 1896 work was begun on the new system. The intake crib was placed four miles from the mouth of the Cuyahoga River and three miles from the spurs on the Government breakwater. This crib is commonly known as the Five Mile Crib, since the 9-foot tunnel which connects it with the Kirtland Street pumping station is five miles in length. This intake crib was completed and placed in operation in April 1904. In 1904 Mr. George C. Whipple, consulting engineer for the city, made an examination of the public water supply, the details of which may be

found in a report on The Quality of the Water Supply of the City of Cleveland, July 1st, 1905.

At the present time bids have been received for the extension of the old intake known as the One Mile Crib, for a distance of 16,000 feet farther into the lake. A 10-foot tunnel will be constructed to connect the new crib with the existing crib and tunnels.

Sewers. Previous to 1896, at which time the State Board of Health approved a system of intercepting sewers, the sewage of Cleveland was discharged, either directly or indirectly, into Lake Erie through a large number of small sewers. At the present time only a portion of the proposed intercepting sewer system has been completed. With the completion of the proposed sewers practically all the sewage of the city will be conducted to the Collinwood outfall, where it will be discharged into the lake approximately eight miles east of the existing crib and nine miles east of the proposed crib.

At the present time two portions of the interceptor have been completed. The West Side interceptor, which receives approximately eight per cent of the total sewage of the city, discharges into the lake opposite West 58th Street. The eastern portion of the interceptor receives approximately forty per cent of the total sewage flow. The sewage is carried through this portion of the interceptor to Collinwood where it is discharged through a submerged outlet extending 2,600 feet into the lake. The remaining fifty-two per cent of the sewage is discharged through the old sewer outlets into the Cuyahoga River. The following table, taken from Bulletin 77, Public Health and Marine Hospital Service, gives the relative quantity of sewage from the various sewer districts:

POPULATION PER ACRE OF SANITARY DRAINAGE DISTRICTS AND PER CENT OF TOTAL SANITARY FLOW.

Name of District.	Outlet into	Population per Acre.	Per cent. of Total Sanitary Flow.
West 45th Street.....	Cuyahoga River	22	52.2
West 25th Street.....	Cuyahoga River	110	
West 9th Street.....	Cuyahoga River	110	
West 9th Street.....	Cuyahoga River	22	
Walworth Run	Cuyahoga River	22	
Kingsbury Run	Cuyahoga River	22	
Broadway and Morgan Run.....	Cuyahoga River	22	
Low Level District.....	Cuyahoga River .....	.....	
West 9th Street.....	Lake Erie	110	
West 3rd Street.....	Lake Erie	110	
Ontario Street	Lake Erie	110	
West 9th Street.....	Lake Erie	110	
East 12th Street.....	Lake Erie	110	

POPULATION PER ACRE OF SANITARY DRAINAGE DISTRICTS AND PER CENT OF TOTAL SANITARY FLOW — Concluded.

Name of District.	Outlet into	Population per Acre.	Per cent. of Total Sanitary Flow.
East 12th Street.....	Lake Erie	22	
East 17th Street.....	Lake Erie	22	
East 26th Street.....	Lake Erie	22	
East 33rd Street.....	Lake Erie	22	
East 38th Street.....	Lake Erie	22	
East 40th Street.....	Lake Erie	22	
Marquette Street	Lake Erie	22	
East 55th Street.....	Lake Erie	22	
East 61st Street.....	Lake Erie	22	
Addison Road	Lake Erie	22	
East 79th Street.....	Lake Erie	22	
East 88th Street.....	Lake Erie	11	
East 96th Street.....	Lake Erie	22	
East 110th Street.....	Lake Erie	11	
Dugway Brook	Lake Erie	11	40.4
West 58th Street.....	Lake Erie		8.3
Grand Total .....	.....		100.9

Scope of Examination. Owing to activities of the Cleveland authorities relative to the pollution of the lake by local sewage, and also to a general movement between the States and provinces of Canada, bordering the Great Lakes, the State Board of Health decided to co-operate with the various organizations and officials in a study of the sanitary conditions prevalent along Lake Erie. In so far as the problem is being studied at Cleveland at the present time as to how to satisfactorily dispose of the city's sewage and to purify the public water supply so that the health of the community may not be endangered, it was decided by the State Board of Health to begin work at that point.

Accordingly, from November 9th, to 28th, 1911, inclusive, one of the engineering assistants was at Cleveland prepared to collect and analyze samples of water and sewage from various points along the Cuyahoga River and from Lake Erie. Owing, however, to the high winds and severe storms, it was possible to make but two trips on the lake, the other samples being collected from the river.

The samples collected from the river were obtained at various points between the breakwater and an old paper mill at the head of navigation and a short distance above Morgan Run. The exact location of the sampling points, together with the sewer outfalls discharging into the river, are shown on accompanying maps. The samples collected from the lake were obtained from points located on three separate courses, designated as Course A, Course B, and Course C. Course A extended

from the spurs of the breakwater nearly north a distance of five miles or two miles north of the intake crib. Samples were collected at various points along this course as shown on an accompanying map. Course B extended due east from the crib eight miles to the Collinwood sewer outfall. Course C extended two miles northeast from the Collinwood sewer to a point off Euclid Beach.

Method of Locating Points and Collecting Samples. After the Courses A, B, and C were decided upon, bearings were obtained which were followed, bringing the boat from which the samples were collected to the various points mentioned. The proper distances between points were obtained by carrying a log, and instruments used for measuring distances traveled upon the water. When the points were reached three samples were collected. In order to facilitate the sampling, four men were necessary. Chemical and bacterial samples were obtained by weighted bottles lowered two feet below the surface of the water, when the stoppers were removed and the bottles allowed to fill. The third sample, collected for the determination of dissolved oxygen, was collected by means of a weighted lead box containing two bottles, one of which was approximately four times the capacity of the other, the smaller one of which siphoned to the larger one. In this manner a representative sample from a 2-foot depth could be obtained with a minimum amount of air being dissolved in the sample. The fourth man was required in order to read the log and observe the bearings. The dissolved oxygen sample was properly treated with MnSO_4 , alkaline KI, and H_2SO_4 immediately after being collected. The other samples were properly labeled and placed in boxes to be taken to the laboratory for analysis.

Analytical Methods in the Field. The following determinations were made upon all samples collected: dissolved oxygen, oxygen consumed, chlorine, and alkalinity. The methods used were those of the standard methods of water analysis, outlined by the American Public Health Association. Besides the chemical results, bacterial work was conducted, plates being poured and bile tubes inoculated. The plates were counted and the per cent of gas read in the field.

Besides the analytical work in the field one set of twenty-four samples, both chemical and bacteriological, were collected and sent to the laboratory for complete chemical and bacteriological analysis. Six mud samples were also submitted to the laboratory for analysis. These samples were collected by means of a 2-foot length of pipe fitted with a check valve. With this apparatus the mud could be pumped into the pipe and drawn to the surface by means of a rope. The mud samples were collected from various points along the Cuyahoga River bed. In accompanying tables may be found the analytical results obtained both from field analyses and the results obtained in the laboratory of the State Board of Health. In so far as the work at this season of the year was so limited in extent, the results obtained do not permit of comparison, and can only be of value in connection with samples which may

be collected in the future. Therefore, at this time, only tabulations will be found. Should the work be carried on during the coming summer, then these results will be of some value.

The chief engineer advised that the scope of the survey was too limited to permit of general conclusions regarding the pollution of Lake Erie and the Cleveland water supply by the sewage from the city. If sufficient information to permit of definite conclusions were to be obtained it would be necessary to carry on extensive studies in the future, but as the city of Cleveland had engaged experts to study the water supply and sewerage conditions with a view to their improvement, it appeared advisable to await the results of these studies before making future extensive examinations at Cleveland.

A copy of this report was sent to the director of public service.

WEATHER CONDITIONS THREE DAYS PREVIOUS TO AND DURING
THE PRELIMINARY SURVEY OF LAKE ERIE AT CLEVELAND,
OHIO, NOVEMBER 6-28, 1911.

Date.	No. Samples Collected.	Location.	Mean Temp.	Precipitation.		Wind.				Sky.
				Rain.	Snow.	Mean Vel.	Prev. Dir.	Max.	Dir.	
6	...	.....	50	.19	0	26	s. e.	56	s. e.	Cloudy
7	...	.....	47	T.	0	29	s. w.	47	s. w.	Cloudy
8	...	.....	40	0	0	10	w.	24	w.	P. cloudy
9	...	.....	43	T.	0	13	s. e.	32	s. e.	Cloudy
10	2	Lake Erie	56	.02	0	16	s. e.	31	s. w.	P. cloudy.
11	1	Cuyahoga River.	60	T.	0	28	s.	44	s.	Cloudy
12	...	.....	44	1.34	.4	36	s. w.	58	s. w.	Cloudy
13	...	.....	18	.02	.2	22	s. w.	46	s. w.	P. cloudy
14	...	.....	26	.20	2.0	18	s.	28	s.	Cloudy
15	...	.....	34	.01	0.1	20	s. w.	37	w.	Cloudy
16	12	Cuyahoga River.	30	.0	0	12	w.	34	w.	Cloudy
17	...	.....	41	.92	0	29	s. e.	44	s.	Cloudy
18	6	Cuyahoga River.	34	.0	0	30	s. w.	52	s. w.	Cloudy
19	...	.....	30	T.	T.	19	s. w.	36	s. w.	Cloudy
20	7	Cuyahoga River.	34	.18	1.6	18	s. e.	32	w.	Cloudy
21	...	.....	34	.02	0.2	17	w.	26	w.	Cloudy
22	24	Lake Erie	34	.0	0	14	s. e.	30	s. e.	Cloudy
23	...	.....	37	.27	0	18	s.	24	s.	Cloudy
24	...	.....	32	.15	1.2	25	w.	42	w.	Cloudy
25	10	Cuyahoga River.	30	.02	0.2	17	s. w.	27	s.	Cloudy
26	...	.....	48	.0	0	14	s.	25	s.	P. cloudy
27	20	Lake Erie	44	.0	0	20	s. e.	34	s. e.	P. cloudy.
28	...	.....	40	.03	0	26	s. w.	42	s. w.	Cloudy

Mean temperature for period November 6-28, 1911, 38° F.

Total rainfall, 3.37 inches.

Total snow, 5.9 inches.

Average wind velocity, 20.7 miles per hour.

Prevailing direction, s. w.

Total wind movement, 11,426 miles.

Per cent cloudy days, 78.3.

Per cent partly cloudy days, 21.7.

Per cent clear days, 0.0.

RESULTS OF ANALYSES OF MUD SAMPLES COLLECTED FROM THE
CUYAHOGA RIVER AT CLEVELAND, NOVEMBER 25, 1911.

Calculated to Dry Basis.

Field No.	Lab. No.	Fixed Solids.	Volatile and Combustible Matter.	Total Fe.	Fe S.	Kjeldahl Nitrogen.	Total Fats.
57	141	82.50%	17.50%	5.92%	0.85%	3.09%	4.16%
58	142	93.73%	6.27%	5.65%	0.30%	1.08%	4.04%
59	143	96.64%	3.36%	3.44%	0.11%	.40%	1.02%
60	144	96.35%	3.65%	3.43%	0.22%	.57%	4.78%
61	145	96.04%	3.96%	4.26%	0.34%	.32%	9.54%
62	146	96.45%	3.55%	4.28%	0.12%	.34%	1.53%

Calculated to Wet Basis.

Field No.	Lab. No.	Fixed Solids.	Volatile and Combustible Matter.	Total Fe.	Fe S.	Kjeldahl Nitrogen.	Total Fats.
57	141	92.23%	1.36%	.46%	.066%	.24%	.323%
58	142	64.56%	2.22%	2.011%	.105%	.334%	1.433%
59	143	52.63%	1.59%	1.63%	.052%	.191%	4.84%
60	144	71.79%	1.03%	.966%	.063%	.16%	1.349%
61	145	70.95%	1.15%	1.236%	.098%	.093%	2.77%
62	146	44.62%	1.96%	2.373%	.065%	.186%	.843%

ANALYTICAL RESULTS OBTAINED FROM SAMPLES OF WATER
COLLECTED FROM THE CUYAHOGA RIVER AT CLEVELAND,
NOVEMBER 8-28, 1911.

Sample No.	Date, 1911.	Location.	Oxygen Cons.	Oxygen Dis.	Chlorine.	Alkalinity.	Bacteria per cc.	Colon present.
3	11-11	Breakwater	1.32	.....	9.	96.	3,800	In 1 cc.
4	11-16	Paper Mills	14.60	11.5	74.	84.	40,000	In .1 cc.
5	11-16	Morgan Run	10.90	11.7	76.	84.	300,000	In .1 cc.
6	11-16	Winding Basin ...	13.60	11.6	83.	100.	150,000	In .1 cc.
7	11-16	Standard Oil Slip.	10.90	11.4	91.	94.	107,000	In .1 cc.
8	11-16	Cuyahoga Avenue.	13.60	11.2	64.	92.	80,000	In .1 cc.
9	11-16	Central Viaduct...	13.60	10.6	62.	78.	49,500	In .1 cc.
10	11-16	Girard Avenue...	16.30	10.3	66.	107.	134,000	In .1 cc.
11	11-16	West Street	15.30	9.9	61.	92.	92,000	In .1 cc.
12	11-16	Columbus Street..	17.00	9.2	61.	88.	208,000	In .1 cc.
13	11-16	Superior Viaduct..	14.80	10.0	54.	88.	83,000	In .1 cc.
14	11-16	L. S. & M. S. Bridge	15.70	9.6	55.	88.	22,800	In .1 cc.
15	11-16	Breakwater	10.70	10.9	24.	84.	114,000	In 1 cc.
16	11-18	Paper Mills	16.60	.....	21.	67.	135,000	In .1 cc.
17	11-18	Winding Basin ...	14.50	.....	22.	65.	164,000	In .1 cc.
18	11-18	Standard Oil Slip.	15.60	.....	21.	66.	119,000	In .1 cc.
19	11-18	Central Viaduct...	15.40	.....	14.	58.	158,000	In .1 cc.
20	11-18	Columbus Street..	16.70	.....	31.	65.	170,000	In .1 cc.
21	11-18	Breakwater .....	.....	.....	.....	.....	93,000	In 1 cc.
22	11-20	Breakwater	3.86	12.0	15.	86.	38,300	In 1 cc.
23	11-20	L. S. & M. S. Bridge	12.20	11.1	33.	78.	285,000	In 1 cc.
24	11-20	Paper Mills	11.40	12.4	42.	74.	.....	.....
25	11-20	Winding Basin ...	9.00	12.4	35.	58.	.....	.....
26	11-20	Standard Oil Slip.	10.40	12.0	33.	60.	.....	.....
27	11-20	Central Viaduct...	13.00	11.4	36.	62.	.....	.....
28	11-20	Columbus Street..	12.10	11.4	35.	62.	.....	.....
53	11-25	Superior Viaduct..	12.08	.....	34.	61.	.....	.....
54	11-25	Columbus Street..	8.83	.....	39.	74.	.....	.....
55	11-25	Central Viaduct...	9.19	.....	34.	64.	.....	.....
56	11-25	Winding Basin ...	8.47	.....	31.	61.	.....	.....

WATER COLLECTED AT CLEVELAND, NOVEMBER 9 TO 28, 1911.

Albuminoid Ammonia.	Free Ammonia.	Nitrites.	Nitrates.	Chlorine.	Alkalinity.	Incrustants.	Total Solids.	Loss on Ignition.	Iron.	Bacterial Results.	
										Number of Bacteria per c. c.	Colon.
				40.	111					250,000	Pres. in 1 c. c.
0.084	0.016	Trace	0.2	11.	90					21,000	Pres. in 1 c. c.
				9.	82	20.0	197	22	1.4	13,000	Pres. in 1 c. c.
0.148	0.064	0.000	0.0	8.	88	20.0	157	7	1.1	3,000	Pres. in 10 c. c.
0.114	0.012	0.000	0.2	7.	84	15.0	148	10	0.7	1,000	Pres. in 1 c. c.
0.088	0.008	0.000	0.2	8.	84	12.5	151	5	0.7	6,000	Pres. in 1 c. c.
0.094	0.022	0.000	0.4	7.	88	15.0	148	15	0.4	18,000	Pres. in 10 c. c.
0.144	0.016	0.000	0.0	7.5	86	15.0	155	10	0.3	18,000	Pres. in 10 c. c.
0.118	0.014	0.000	0.2	8.5	88	12.5	142	17	0.3	24,000	Pres. in 1 c. c.
										13,500	Pres. in 1 c. c.
0.172	0.014	0.000	0.2	7.	88	12.5	136	9	0.3	6,000	Pres. in 10 c. c.
0.086	0.012	Trace	0.2	7.	92	12.5	145	11	0.6	12,000	Pres. in 10 c. c.
0.154	0.008	Trace	0.2	8.	88	12.5	150	19	0.7	17,280	Pres. in 10 c. c.
										24,000	Not in 10 c. c.
0.146	0.006	0.000	0.2	8.	87	17.5	158	29	0.3	17,000	Pres. in 1 c. c.
0.118	0.006	0.000	0.2	9.	92	12.5	147	14	0.5	34,000	Pres. in 10 c. c.
0.108	0.046	0.000	0.2	9.	92	15.0	150	15	0.6	26,400	Pres. in 1 c. c.
0.086	0.004	0.000	0.0	8.	94	15.0	147	14	0.5	11,000	Pres. in 10 c. c.
0.078	0.010	0.000	0.2	8.5	96	17.5	154	14	0.4	18,000	Pres. in 1 c. c.
0.168	0.006	0.000	0.2	7.5	94	17.5	147	14	0.4	25,000	Pres. in 1 c. c.
0.072	0.006	0.000	0.2	8.	90	12.5	147	12	0.7	11,000	Pres. in 1 c. c.
0.090	0.010	0.000	0.0	8.	91	17.5	149	12	0.8	25,000	Pres. in 1 c. c.
22.25 ¹	16.75 ²	0.001	0.0	20.	128	275. ³	373	47 ⁴ 74	.....	37,800	Pres. in 1/10 c. c.
0.104	0.066	Trace	0.2	8.5	92	17.5	176	19	1.4	11,000	Pres. in 1 c. c.
0.108	0.032	0.000	0.2	9.	92	17.5	157	12	1.2	10,000	Pres. in 1 c. c.
0.100	0.028	Trace	0.2	9.	94	15.0	157	22	1.2	7,000	Pres. in 1 c. c.
				15.	88					23,000	Pres. in 1 c. c.
				8.	94					11,100	Not in 1 c. c.
				10.	88					11,800	Pres. in 1 c. c.
				10.	87					14,400	Not in 1 c. c.
				10.	108					2,000	Not in 1 c. c.
				10.	110					130	Not in 1 c. c.
				8.	69					2,700	Pres. in 1 c. c.
				10.	88					430	Not in 1 c. c.
				9.	84					110	Pres. in 1 c. c.
				9.	88					560	Not in 1 c. c.
				10.	88					1,440	Not in 1 c. c.

ANALYTICAL RESULTS OBTAINED FROM SAMPLES OF LAKE ERIE

Series.	Date.	Sample Numbers.		Location.	Color.	Turbidity.	Sediment.	Odor.	Oxygen Consumed.
		Laboratory.	Field.						
First.	11-22-11		40	Course "B" 2 mi. from					2.62
			41	Crib "B" 3 mi. from					1.12
			42	Course "B" 4 mi. from					1.31
			43	Crib "B" 5 mi. from					1.59
			44	Course "B" 6 mi. from					1.59
			45	Crib "B" 7 mi. from					1.41
			46	Course "B" 7¼ mi. from					1.69
			47	Crib "B" 7½ mi. from					1.69
			48	Course "B" 7¾ mi. from					1.70
			49 ^s	Crib "B" 7⅞ mi. from					27.16
			50	Course "C" ½ mi. from					1.78
			51	Course "C" 1 mi. from					1.78
			52	Sewer "C" 2 mi. from					1.59
				Sewer					
			63	Course "A" Breakwater.					6.84
Second.	11-27-11		64	Course "A" ½ mi. from					1.23
			65	B. W. Course "A" 1 mi. from					1.23
			66	B. W. Course "A" 2 mi. from					1.31
			67	B. W. Course "A" 3 mi. from					1.05
			68	B. W. Crib "B" ½ mi. from					1.58
			69	Crib "B" 1 mi. from					1.14
			70	Course "B" 2 mi. from					1.14
			71	Crib "B" 3 mi. from					1.40
			72	Crib "B" 4 mi. from					0.96
			73	Course "B" 5 mi. from					1.23
			74	Crib "B" 6 mi. from					1.23
			75	Course "B" 7 mi. from					1.58
			76	Crib "B" 7½ mi. from					1.40
			77	Course "B" 7¾ mi. from					1.75
			78 ^s	Crib "B" 7⅞ mi. from					11.40
			79	Course "C" ¼ mi. from					1.75
			80	Sewer "C" ½ mi. from					1.66
			81	Sewer "C" 1 mi. from					1.84
			82	Sewer "C" 2 mi. from					1.84
				Sewer					

WATER COLLECTED AT CLEVELAND, NOVEMBER 9 TO 28, 1911 — Concluded.

Albuminoid Ammonia.	Free Ammonia.	Nitrites.	Nitrates.	Chlorine.	Alkalinity.	Incrustants.	Total Solids.	Loss on Ignition.	Iron.	Bacterial Results.	
										Number of Bacteria per c. c.	Colon.
.....				11.	88	.....	.....	.....	.....	700	Not in 1 c. c.
.....				9.	89	.....	.....	.....	.....	14,900	Pres. in 1 c. c.
.....				9.	92	.....	.....	.....	.....	3,500	Pres. in 1 c. c.
.....				9.	87	.....	.....	.....	.....	650	Not in 1 c. c.
.....				10.	95	.....	.....	.....	.....	510	Not in 1 c. c.
.....				10.	98	.....	.....	.....	.....	150	Pres. in 1 c. c.
.....				10.	95	.....	.....	.....	.....	560	Not in 1 c. c.
.....				9.	88	.....	.....	.....	.....	6,400	Not in 1 c. c.
.....				10.	90	.....	.....	.....	.....	3,500	Pres. in 1 c. c.
.....				30.	124	.....	.....	.....	.....	3,900,000	Pres. in 1/1000 c. c.
.....				12.	88	.....	.....	.....	.....	60,000	Pres. in 1/10 c. c.
.....				9.5	90	.....	.....	.....	.....	14,000	Pres. in 1/10 c. c.
.....				10.5	90	.....	.....	.....	.....	7,900	Pres. in 1/10 c. c.
.....				29.	76	.....	.....	.....	.....	14,900	Pres. in 1 c. c.
.....				10.	86	.....	.....	.....	.....	800	Not in 1 c. c.
.....				10.	92	.....	.....	.....	.....	400	Not in 1 c. c.
.....				10.	92	.....	.....	.....	.....	100	Not in 1 c. c.
.....				11.	90	.....	.....	.....	.....	10	Not in 1 c. c.
.....				9.	92	.....	.....	.....	.....	15	Not in 1 c. c.
.....				10.	90	.....	.....	.....	.....	7	Not in 1 c. c.
.....				12.	90	.....	.....	.....	.....	200	Not in 1 c. c.
.....				10.	92	.....	.....	.....	.....	30	Not in 1 c. c.
.....				10.	88	.....	.....	.....	.....	500	Not in 1 c. c.
.....				10.	92	.....	.....	.....	.....	20	Not in 1 c. c.
.....				10.	98	.....	.....	.....	.....	250	Not in 1 c. c.
.....				9.	88	.....	.....	.....	.....	700	Not in 1 c. c.
.....				11.	94	.....	.....	.....	.....	1,000	Not in 1 c. c.
.....				10.	90	.....	.....	.....	.....	4,500	Pres. in 1 c. c.
.....				35.	122	.....	.....	.....	.....	2,500	Pres. in 1 c. c.
.....				10.	94	.....	.....	.....	.....	2,000	Pres. in 1 c. c.
.....				10.	106	.....	.....	.....	.....	1,500	Pres. in 1 c. c.
.....				10.	92	.....	.....	.....	.....	4,800	Pres. in 1 c. c.
.....				12.	100	.....	.....	.....	.....	6,000	Not in 1 c. c.

Notes.—* Oxygen consumed in filtered sample. ¹ Total kieldahl nitrogen. ² Kieldahl nitrogen filtered sample. ³ Total solids filtered sample. ⁴ Loss on ignition filtered sample. ⁵ Collinwood submerged sewer outlet which extends 2600 feet into the lake.

REPORT ON INVESTIGATION OF THE SEWAGE PURIFICATION WORKS AT GENEVA WITH REFERENCE TO THE POLLUTION OF COWLES CREEK.

On September 5th, 1912, the State Board of Health received a petition signed by twenty-eight citizens of the village of Geneva, requesting the Board to take action to improve the condition of the sewage purification works of that village, and also to abate a nuisance caused by refuse deposited near the plant. On October 2nd, 1912, the principal assistant engineer visited Geneva and investigated the complaint. The following report was submitted:

Geneva is a village with a population of about 2,500, located in the northern portion of Ashtabula County, four miles from Lake Erie. Cowles Creek passes through the central portion of the village and discharges into the lake.

In 1904 the village installed a system of sanitary sewers and sewage treatment works, the latter being located at the northerly edge of the community. The plant comprises a septic tank, storage reservoir, dosing tank, and six intermittent sand filters. It was designed to treat a daily sewage flow of not more than 80,000 gallons.

During the past few years, the State Board of Health has received several complaints against the condition of the plant. In February, 1911, the State Board of Health was petitioned by the local Board of Health to take action under the Bense Act to improve conditions. The subsequent investigation revealed the fact that no decided nuisance was being caused in the stream but the village authorities were advised that the plant was of inadequate capacity and should be enlarged.

In May, 1912, a communication was directed to the local authorities calling their attention to the inadequate size and improper condition of the plant, and advising that plans for its reconstruction be made. Regardless of the various letters of advice no steps have been taken by the village to improve the plant.

The investigation of October 2nd, 1912, revealed the fact that the sewage flow was approximately 350,000 gallons per 24 hours. The retention period in the tank was, therefore, only 2.7 hours, while the rate of filtration was over 600,000 gallons per acre per day. It will readily be seen that the plant is totally inadequate to properly treat the sewage. The excessive sewage flow is due largely to the entrance of ground water into the sewers, which fault might be corrected by proper procedure after advice of a competent engineer.

Cowles Creek, which receives the effluent and very frequently the bypassed raw sewage, has a watershed area of about twelve miles above the sewage treatment works. It flows through meadow land which is

used for cattle grazing, and in a polluted condition gives rise to warranted complaint. On October 2nd, 1912, it was noted that the creek had recently received a large quantity of untreated sewage, the effects of which could be detected for a distance of about one mile below the works. The heavy deposits of sludge in the creek and the discoloration of the water clearly showed the presence of sewage. Above the plant the stream was found to be in a cleanly condition.

Regarding the nuisance created by the deposition of refuse near the plant, it was ascertained that the procedure of dumping rubbish on the banks of Cowles Creek had been authorized by the local authorities. At the time of the investigation the conditions were not extremely bad, although it is apparently advisable that the practice be stopped and that a suitable burial ground for refuse be provided by the corporation.

SUMMARY.

From the foregoing it will be noted that in spite of repeated advice by the State Board of Health, the village of Geneva has failed to improve its sewage treatment works to enable them to operate in the proper manner. Obviously the Board should insist that improvements be made as soon as possible.

Regarding the dumping of refuse on the banks of Cowles Creek, the Board should urge that this practice be immediately stopped and that a suitable burial ground be provided.

ACTION OF THE BOARD.

At a meeting of the State Board of Health, held in Columbus on October 23rd, 1912, this report of the chief engineer was considered, and the Board found that the village of Geneva had failed to improve its sewage purification works so as to enable them to efficiently treat the sewage of the village; and that the practice of dumping refuse on the banks of Cowles Creek should be stopped.

At a meeting held November 21st, 1912, the Board considered the condition of the sewage purification plant at Geneva and voted to require the village of Geneva to reconstruct and enlarge the sewage purification plant of the village in a manner satisfactory to the State Board of Health within one year from date; namely, November 21st, 1913.

REPORT ON INSPECTION OF FLOODS AT MINERVA, SALINEVILLE, IRONDALE, CREAM CITY AND HAMMONDSVILLE.

On the night of September 1st, 1912, a heavy rain fell over portions of Stark, Carroll, Columbiana and Jefferson counties, and also

over portions of West Virginia and Pennsylvania. The rain was of such intensity and duration that the small streams assumed flood conditions within a short period and thereby caused much damage to private as well as public property. The State Board of Health was asked by the affected districts to give advice relative to the proper sanitary precautions to be taken and also to outline methods for the removal and disposition of waste material. In accordance with these requests a representative from the Board visited Minerva, Salineville, Irondale, Cream City and Hammondsville, and gave advice concerning the proper abatement of the nuisances created by the deposition of



View of railroad bridge which diverted the water directly towards the electric lighting plant which was completely destroyed. Note the water closet caught at the left end of the wrecked bridge.

putrescible substances carried by the high waters. The following will therefore include only a description of conditions as observed in Ohio.

Minerva is located on Clear Fork of Sandy Creek, which is tributary to the Tuscarawas River. Salineville is located at the junction of Nancy Run and Riley Run, which unite to form the North Fork of Yellow Creek. Irondale, Cream City and Hammondsville are located a short distance above the confluence of the North Fork of Yellow Creek with Yellow Creek. All of these streams occupy narrow valleys with hills rising rapidly on either side to an elevation of from 100 to 200 feet. The broken topography causes a rapid run-off and the

streams are therefore flashy. Even a moderate rain will cause the creeks to assume the proportions of a small flood.

The southeastern portion of the village of Minerva is built upon low ground which is protected from floods by a county dike and the embankment of the Pennsylvania Railroad. At the time of the recent flood the waters rose rapidly in Clear Fork until they reached the railroad bridge which crosses the stream. The bridge, which is of the plate girder type, retarded the flow of the water which eventually washed away a portion of the protecting dike. The water then passed rapidly into and soon covered the lower portions of the village. One of the most interest-



View showing the relative elevation of the water and the class of material carried by the flood.

ing facts observed was that the elevation of the water in the flooded area behind the protecting embankment and in the stream above the railroad bridge was about five feet higher than that of the water in the stream below the railroad bridge. This is explained by the fact that the bridge diverted the water so that it was forced across the embankment and into the village, and also that but a small outlet was provided whereby the water from the flood district might pass into the stream below the railroad bridge. Had a larger outlet, properly constructed, been installed the water would not have reached so great an elevation and would have passed more rapidly from behind the embankment as the water in the creek receded. As it was, the district was flooded for three days. Ow-

ing to the fact that the lower portions of the village were protected by the embankment there was no current. This prevented the washing away and complete destruction of the house. Many waterclosets and small sheds were overturned but the most serious damage was done by the deposition of mud and slime upon the floors and walls and in the cellars of the houses and also upon the surface of the ground. All garden truck in the district was destroyed and had to be removed from the village. The contents of water closets was deposited about the district and great care was necessary in order to insure the complete collection of such material. The village fire department flushed all of the streets, alleys and sidewalks and the residents of the district were busily engaged in cleaning their homes and in pulling garden truck. All waste material was piled along the streets or alleys where it was easily accessible to the men with wagons who were hauling it to the country where it was either burned or buried. Lime was generously distributed and was scattered over the entire district. It is interesting to note that the village officials and citizens were co-operating in the work of improving the sanitary condition of the affected area.

The public water supply is obtained from four drilled wells ranging in depth from fifty to fifty-five feet. The wells, together with the pumping station and electric lighting plant, both of which are municipally owned and operated, are located along the bank of Clear Fork. The wells are cased in such a manner that no pollution from surface water could enter them. Practically no damage was done to the water-works equipment. The electric lighting equipment was, however, more or less seriously damaged.

The village of Salineville is built in the narrow valley of Riley Run. The run meanders from one side of the valley to the other, so that several bridges are necessary to make complete the main street of the village. The location of the village is such that a large amount of damage may be caused by floods. The bridges have all been constructed by the county which has, in order to minimize expense, built the bridges as short as possible. The construction of the bridges was responsible for a large portion of the damage done at Salineville. All but one of the county bridges were destroyed and in addition two bridges belonging to the Pennsylvania Railroad were displaced while a third one was badly damaged. Many buildings were completely destroyed while others were seriously damaged by the deposition of mud and slime. Many cellars were filled with water which it was necessary to remove, either by pumping or bailing, owing to the fact that the cellar drains were clogged. Several of the stores were flooded and much provision was thereby either seriously damaged or completely destroyed.

The village was practically without funds and the work of removing the rubbish was proceeding slowly. The dead animals were being searched for and were buried as soon as found. Many open vaults

were left unprotected and the odors arising from the same were very offensive. The chief difficulty arose from the fact that the village had bonded itself to the limit allowable by law for the purpose of installing street pavements. No funds were available for emergencies. This should be a lesson to all municipalities demonstrating to them the advisability of always keeping a small fund to be used only in cases of extreme necessity.

Only a small amount of lime was available. This was scattered about the village but much more was needed. The village was advised to order a sufficient quantity of lime, and in addition it was believed



View showing how the county bridges were destroyed and also the effects of the flood upon buildings located along Riley Run.

wise to secure a small quantity of bleaching powder to be used in privy vaults and in other places where sewage was known to exist. The striking feature at Salineville was the absence of organization of the local officials, due largely to the lack of public funds.

The electric lighting plant, which was privately owned, was completely destroyed. The gas lines and water mains were broken at several places so that the village was without light, gas and water, for a period of about thirty-six hours. The water mains were repaired by installing three-inch lines between fire hydrants located on each side of the breaks. The electric lighting plant and gas mains had not been repaired. Work was progressing on the gas mains but it will probably

be several weeks before new lighting equipment can be installed. The public water supply, which is obtained from two dug wells located in the valley of Riley Run, a short distance above the village, was subjected to more or less contamination. Samples collected from the supply were submitted to the laboratory of the State Board of Health for analysis. The analyses showed the water to be but slightly polluted, but sufficiently so to make it advisable for the people to boil the water to be used for domestic or drinking purposes.

Between Salineville and Irondale the Pennsylvania Railroad tracks were badly damaged and it was not until September 5th that they were sufficiently repaired so that traffic could be resumed. Railroad tracks



View showing the effects of the flood on the main street of Salineville. All of the houses shown in the picture were damaged by the high water. Houses located on lower ground were flooded up to the second floor.

and bridges, county roads and bridges were in many places completely washed away. The large tanks of the Standard Oil Company were displaced and carried two or three miles below Salineville. The sides of the valley were covered with debris and wherever a bridge remained in place, rubbish was piled high upon it.

The conditions at Irondale, Cream City and Hammondsville were very similar to those in Minerva and Salineville. But one or two buildings were washed away. The greatest damage done was caused by the mud and slime which covered everything with which the water came in contact. The difficulty arising in these three hamlets, which are not in-

corporated, was due to the fact that the township trustees had agreed that each would act as health officer for his respective section of the township. All three trustees are farmers and none of them had sufficient time to devote to the work at the time of the flood. No funds were available to pay men for cleaning away the rubbish, or to purchase lime. A private citizen ordered a car of lime and was distributing it to the people who were affected. He believed the trustees would reimburse him. It is difficult to understand why the trustees should neglect their duty to the extent of not calling a meeting until Saturday, although the flood occurred on the Sunday night previous. Owing to the fact that the trustees refused to act it became necessary for the State Board of Health on September 12th, 1912, to appoint and fix the salary of a health officer for the township.

The small hamlets obtain their water supply from private dug wells, most of which are shallow. Several of these wells were covered at the time of the flood. Samples were collected from such wells and analyzed in the laboratory of the State Board of Health. All the samples from the wells indicated upon analysis that the water was of unsanitary quality.

It has been shown by the above description that the greatest damage done by the flood was caused by the deposition of mud and slime upon everything with which the water came in contact. It was necessary to enter the houses, take a shovel and hoe and remove all the mud possible. After the heavier portion was taken out, the walls and floors were scrubbed with a broom and clear water. After the houses were fairly well cleaned, soap and water were used. The cellars were cleaned much in the same manner. As soon as a room was cleaned, lime was scattered about and the doors and windows left open in order that it might dry as rapidly as possible. It was impossible to remove the mud from the surface of the ground so it was necessary to scatter lime over the entire area flooded. Rubbish deposited by the flood was either burned or hauled away. All garden truck was hauled into the country where it was buried. The water closets were ordered cleaned by the local health officers. The contents of the vaults were taken to the country, and the cleaned vaults were either well limed or treated with bleaching powder. All dead animals were buried as soon as found.

The comparative efficiency of the different communities in handling the flood condition is interesting and at the same time instructive. Where the village had not bonded itself to the allowable limit and where a health officer was regularly employed, the improvement of the sanitary conditions after the flood was both rapid and effective. At both the other communities, one without funds and the other without a health officer, the work progressed slowly and in an unorganized manner. Too much emphasis cannot be laid upon these facts. Every community should provide for the proverbial "rainy day" and should also insist

that some responsible person should be placed in charge of local health matters. When these conditions are met, the people have a greater chance of avoiding the ravages and expense of an epidemic which might otherwise occur.

INSPECTION OF SUMMER RESORTS IN OHIO.

REPORT ON AN INSPECTION OF THE SUMMER RESORTS AT BUCKEYE LAKE.

Buckeye Lake is located in Fairfield, Licking and Perry counties and is about twenty-eight miles east of Columbus. The construction of the reservoir was begun in 1828 and finished in 1832, its purpose being to serve as a feeder for the Ohio Canal. It is stated that the watershed area is about 90 square miles, and it is estimated that the area of water surface is about 4,000 acres. The reservoir has an average depth not exceeding 15 feet and there are marked variations, depending upon the season of the year, below this point.

In 1894 the General Assembly of Ohio set aside the reservoir for public uses and designated the name "Buckeye Lake." Since that time the reservoir has come to be used to a large extent for pleasure purposes. This has been especially true during the last few years since the practical abandonment of the Ohio Canal in this section. At the present time there are several resorts located on or near the lake, among which may be mentioned Buckeye Lake Park, Summerland Beach, and Lakeside. In addition to these communities summer cottages are found practically surrounding the lake and on the majority of the islands. It is estimated that there are about 900 summer cottages surrounding this body of water.

BUCKEYE LAKE PARK AND SURROUNDINGS.

Buckeye Lake Park is situated in Licking County. It is owned, with the exception of the state reservation immediately around the lake, by the Ohio Electric Railway Company and is under lease to Mr. W. D. Harris, who acts as manager of the park, maintains a hotel and various amusement establishments. It is estimated that 150,000 people visit the park annually, spending a day or two. On the day of the inspection it was estimated by the above named company that there were at least 1,000 transients at the park. The number varies from 1,000 to 4,000 during the regular season. It is impossible to estimate accurately the number of people who reside at Buckeye Lake Park and vicinity during the summer months, but it is thought to be in the neighborhood of 1,000 people. Immediately outside the park, extending north, east and west, are a large number of cottages closely packed together in certain lo-

calities. The sanitary conditions within the park itself and the territory immediately surrounding it are extremely bad.

Water Supply. The various buildings are supplied with water by means of a small distribution system. The supply of water is regularly drawn from a drilled well and the water is pumped to an elevated tank located in the park from which it is furnished to the various buildings by gravity. It is presumed from the character of this well that the supply of water is good. The elevated tank above referred to has also a connection with the water in Buckeye Lake, an intake being maintained and the water drawn from the lake when for any reason it is impossible to pump from the well or when an emergency supply is needed. As it is well known that the water of the lake is polluted to varying degrees by sewage, it can readily be seen that the water which periodically is pumped in the elevated tank and admixed with the water pumped from the driven well will be of unsatisfactory quality and extremely dangerous for domestic use. The water from this elevated tank besides being used for washing purposes in the various buildings in the immediate vicinity, supplies numerous hydrants used for drinking purposes throughout the park.

Sewerage. The methods of disposing of the sewage from the park are absolutely insanitary and objectionable from every standpoint of public health. The buildings are provided with crude water closets and the sewage is conducted into four cesspools through which it is said to pass in series. We are informed that until recently only three cesspools were used, the third being connected with a tile ditch discharging into Waste Weir Run, a small watercourse which serves to carry away the overflow from the lake. It is claimed that this connection with the tile ditch has been abandoned recently and the fourth cesspool has been built as a result of an injunction preventing the discharge of the sewage into the above mentioned tile ditch. This fourth cesspool is inadequate to receive and properly dispose of the sewage. An overflow from this fourth cesspool has been established by means of a trench, and consequently at the present time the overflow of sewage runs out on the open ground in the immediate vicinity. The four cesspools above referred to are located in close proximity to the building known as the "Skating Rink." They are also located within 50 feet of several of the other buildings and some cottages. The first three cesspools constructed are covered with earth and are not open for inspection. The fourth and recently made cesspool from which the overflow comes, is covered with a thin and old wooden platform. Foul and obnoxious odors arise from this cesspool and the surrounding sewage-saturated soil. The overflow sewage from these four cesspools flows directly under the skating rink building and by means of two trenches is conducted into a circular pond called Minnow Lake, on the other side of the skating rink building and back of the merry-go-round building. At the present time this pond is an open,

foul-smelling cesspool. The liquid is black in color and in a high state of putrefaction and fermentation. The ground immediately surrounding the pond within a radius of 50 feet is saturated with the seepage and overflow and gives rise to extremely foul conditions. Part of this overflow also is carried across a road to the ground on the other side by means of a shallow trench. The final disposal of all this sewage is by evaporation and by seepage into the ground. In close proximity to the above mentioned Minnow Lake containing the sewage are several open picnic shelters used for lunching purposes.

Garbage and Refuse. It is stated that the garbage and other refuse from the hotel and cottages in the immediate vicinity is collected regularly every few days and hauled out and buried. The inspectors were unable to corroborate this statement. However, it may be said that no large amounts of garbage or other refuse were noted in this section.

Screens. The majority of the buildings in this vicinity were fairly well screened but not all the screens were in good condition.

Bathing. Surrounding a small part of the reservoir known as Crane Lake are numerous boat houses maintained and operated by the park management. In a number of these houses individuals were found living and sleeping. Sewage and other wastes are deposited directly in the water from these boat houses. Within a short distance from where some of these boat houses are located, which were occupied on the day of inspection, is located the so-called "Bathing Beach" of the park. In the afternoon of the day of inspection at least 50 to 100 men and women were bathing in this water of Crane Lake. There is no question but what this water is polluted by sewage and other refuse from various parts of Crane Lake.

A short distance to the east of Buckeye Lake Park, near "Observation Hill" is located a small community of cottages. These cottages seem to have been built with some restrictions regarding the provision of plumbing and are said to be provided with water from the Park supply. A common sewer has been installed which carries away the sewage and other wastes from these dwellings. This sewer is an 8-inch vitrified pipe line extending in a northeasterly direction to the easterly end of Crane Lake. The construction of this sewer is very unsatisfactory. There are no manholes provided and it is laid very near the surface of the ground and no attention has been paid to proper grades. At one point, which appeared to be a low point of the line, the sewer was on the surface of the ground and the sewage was seeping from the joints in rather large amounts. The ground for 25 feet or more around these joints was saturated with filth and in a decidedly offensive condition. The cesspool into which this sewer discharges was constructed only recently and is located about 20 feet from Crane Lake. It is covered with earth and there is no visible nuisance. The old cesspool which has now been abandoned, according to statement, has not been cleaned or filled with

earth and is covered by several old row boats, which consequently did not prevent offensive odors from the liquid standing in the cesspool permeating the atmosphere.

All of the summer cottages north and west from Buckeye Lake Park are provided with outside privy vaults. These vaults as a rule are not properly constructed and in the majority of instances are located within 25 feet of the cottages. In one section directly north of Crane Lake where several cottages front in the same direction toward the lake, one to the back of the other, etc., these privy vaults are located within at least 25 feet of the front of the rear cottages and give rise to very unpleasant odors. The houses in this vicinity were fairly well screened and the garbage seemed to be taken care of in proper receptacles.

West of Buckeye Lake Park a small open ditch was found in which a large flow of sewage was noted. It was impossible to trace the source of all this sewage, but it seemed to originate from near Buckeye Lake Park, and as it passed in a westerly direction partly through the tile ditch and partly as an open ditch it received the waste discharges of several restaurants and buildings, such as the Glass Hotel, the Home Restaurant, the Star Restaurant, etc. Back of the Glass Hotel, a seemingly well constructed cesspool was noted. In view of the apparent inability of the soil to dispose of sewage by absorption, it is quite likely that the cesspool is provided with an overflow into the ditch. At one place three privies were noted huddled together, all discharging eventually into a small ditch which led directly into this open sewer. Refuse of all kinds was noted at the back of several of the restaurants and houses mentioned. The ditch above referred to eventually enters a tile ditch which discharges into Waste Weir Run on the land of J. C. Neel. At the point of outlet of this tile ditch marked evidences of sewage contamination were apparent. The danger from fly infection from this ditch which passes under quite a number of cottages as above mentioned is, of course, apparent.

BLUE GOOSE ISLAND.

About one and one-half miles east of Buckeye Lake Park is located a section of land which is given over to saloons and gambling houses. Three establishments were in operation at this point. These are called "The Blue Goose", "The Haufbrau", and "The Red Star" cafes. The sanitary conditions about these resorts are extremely bad. Back of the "Blue Goose" cafe and located directly on the edge of the lake were two extremely insanitary privies, one for women and one for men, in very close proximity. The discharge from these privies drains directly into the lake. Behind this saloon also was piled all sorts of refuse. The garbage is collected and hauled by wheelbarrow some distance back of the resorts and dumped into the lake. The water front near

all of these resorts is littered with all sorts of refuse, beer bottles, tin cans, and the like.

SUMMERLAND BEACH.

Summerland Beach is located in the extreme southwesterly portion of the reservoir. It consists of a small community of cottages, tents and hotels, owned by the Summerland Beach Improvement Company and is at the present time used as a summer Chautauqua and also a summer school for Denison University. A great many of the residents remain throughout the summer or a large part of the season and only on rare occasions are there many transient visitors. A large hotel is maintained by the company, as well as a large administration building and dormitory in close proximity.

Water Supply. The water supply of the hotel and administration building and dormitory is secured from a deep drilled well which furnishes satisfactory water. The cottagers and occupants of the tents in the immediate vicinity carry water from this well for use. This water is used largely for drinking and cooking, as it has objectionable characteristics for laundry and washing purposes. For these purposes in the hotel water from Buckeye Lake is supplied, being pumped and distributed through the hotel and administration and dormitory buildings. It was noted that the faucets in the hotel were not marked to show that this water was objectionable for drinking purposes.

Sewerage. The hotel is provided with modern plumbing conveniences and the sewage is disposed of by means of a watertight cesspool followed by a rather crude system of underground filters. The final effluent is discharged into the lake and at this point there is not a marked objection. Some odor was apparent near the cesspool and underground filters, but no doubt this was due to the fact that they were not properly constructed. The administration building and dormitory, above referred to, is provided with public closets for the convenience of the residents and has modern plumbing. The sewage from this building is disposed of in a plant similar to the one supplying the hotel, consisting of a cesspool and underground filters. The effluent from this last mentioned underground filter was not as satisfactory as that coming from the hotel, due to the fact that the filter was probably not carefully constructed. The cottages occupied by the permanent summer residents were provided with outdoor privies.

Garbage and Wastes. The garbage is collected every morning and hauled some distance back of the grounds and buried. It is very satisfactorily handled in closed cans.

Screens. It was noted that the buildings are very well screened and that in the majority of instances the screens are in good condition. The number of flies present was comparatively few.

Bathing. The bathing beach is near the pier and the only objection

to its immediate location is that the outlet from the underground filters carrying the sewage from the hotel is not over fifty yards distant from the upper limit of this bathing beach.

LAKESIDE.

Lakeside is a summer resort lying about three miles west of Buckeye Lake Park and consists of a hotel and about fifty cottages. The cottages, the majority of which are situated on the edge of the road embankment surrounding the lake, appear for the most part to be vacated and very few were screened. The water supply is derived from driven wells the greater part of which have artesian flow and vary in depth from 35 to 60 feet. In a number of cases water intake pipes were seen to lead from the lake directly to the cottages. It was impossible to learn whether the lake water is used for other than auxiliary purposes such as scrubbing, etc. Each cottage is provided with a privy, the majority of which are kept locked and could not be examined. However, those examined showed unlined vaults which needed cleaning. A number of these had been well lined and were fairly odorless, but none, however, were screened. An inspection at one cottage situated west of the hotel showed two privies within four feet of an artesian well, while one of them was located within 3 feet of the cottage. These privies were locked and could not be examined. In another instance a privy was found within 15 feet of a flowing well.

The hotel at Lakeside is a two story wooden structure and capable of accommodating forty guests. Two privies, one for each sex, serve the residents. The men's privy is located about 50 feet from the hotel. Examination showed it to be in a most unsanitary condition. The vault was full to overflowing and the liquor had seeped through and covered the floor. In the rear of the vault, which was partly open, fecal matter and seepage had saturated the ground for about ten feet around the privy. Flies infested the surroundings. The water supply for the hotel is derived from a well which is well removed from any source of pollution. The garbage at and around Lakeside is either buried, burned or fed to chickens and hogs, although a goodly portion may be seen scattered about the ground. At the rear of the majority of the cottages west of the hotel is a small ditch containing water black in color and heavily scummed. The banks of this stream as well as the stream itself showed that considerable garbage and rubbish is dumped into it. The water is practically stagnant and swarms of flies infest its surroundings. Food supplies are purchased at the grocery in Lakeside, which is well screened.

AVONDALE.

This is a small summer resort situated about three miles east of Buckeye Lake Park on the B. & O. R. R. on the northerly shore of the

Lake. The buildings comprise a hotel, dance hall, bar, ice house, several barns, chicken yards, hog pens, etc. The hotel is capable of accommodating about forty guests. Two privies serve all the residents and transient population. The men's privy was in a fair condition although in need of cleaning. This privy is well removed from habitation and the water supply, which is derived from a dug well 25 feet deep located near the hotel. Garbage is fed to the chickens and hogs. Rubbish, ashes, etc., is dumped near the ice house located on the lake shore. The moral character of this resort is questionable.

PATTERSON'S.

This resort is situated diagonally across from Avondale and consists of a house and bar. Water supply is derived from a dug well. The privy is situated on the lake shore and discharges directly into the lake. Garbage is fed to chickens.

THORNPOROT.

Thornport is a community of approximately 200 population and is situated at the easterly end of Buckeye Lake. Its water supply for the most part is derived from dug wells and most of the privies are located on the water's edge. One property owner located on the lake shore has a plot of ground 30 x 42 feet in size upon which he has placed a house, a fair sized barn, a chicken yard, a privy and a dug well. This privy is located on the water's edge and discharges directly into the lake. The community has experienced considerable trouble with Thornville, a village of about 800 population located about one mile south of Thornport. Thornville persists in hauling its rubbish to Thornport and dumping it into the lake along a road at this village. This rubbish consists of loads of rusty fence wire, sheet tin scraps, broken bottles and at times old and decayed meats and vegetables. During duck hunting season the lake is drained three or four feet and the lake at Thornport becomes dry causing a nuisance. Garbage from the village is fed to chickens and hogs. Food supplies other than farm produce are purchased in Thornville.

Recommendations.

BUCKEYE LAKE PARK AND SURROUNDINGS.

1. The existing water supply is rendered unsafe by the presence of the polluted emergency supply drawn from the lake. This emergency supply should be abandoned and the intake removed and the present well supply increased.
2. The disposal of sewage by cesspools, aside from creating nuisances, is impracticable owing to the non-porous nature of the soil. The privies in the vicinity of the summer cottages are also very objectionable. These cesspools and privies should be abandoned and removed, and a system of sanitary sewers with sewage purification provided. The aban-

donment of the privies may be made possible by the installation of properly constructed water closets or latrines connected to sewers.

3. The sewer serving the group of cottages lying east of Buckeye Lake Park is of improper construction and it as well as the cesspool into which it discharges should be abandoned and removed and a suitably constructed sewer forming part of a comprehensive system should be substituted.

4. The use of the bathing beach is improper and dangerous to health and should be prohibited.

5. The territory surrounding Buckeye Lake Park, especially that section lying about one mile to the east and occupied by three cafes, should be generally cleaned up and the refuse properly disposed of.

SUMMERLAND BEACH.

1. The use of a dual water supply obtained from wells and from the lake is a source of danger. All taps through which lake water may be drawn should be clearly designated by a sign or otherwise to avoid its misuse for domestic purposes.

2. The existing methods of disposing of sewage from the hotel and administration building and dormitory are not entirely satisfactory, but an attempt has been made in the right direction. Improvement should be made at the close of the present season by reconstructing the secondary devices of purification.

3. The use of privies in close proximity to the cottages is objectionable. The privies should be abandoned and properly constructed water closets or latrines connected to a sewer should be installed.

4. The bathing beach is at present in dangerous proximity to a sewer outlet. The location of the bathing beach should be changed or that of the sewer outlet.

LAKESIDE.

Cottages and privies should be properly screened.

Privies should be cleaned and disinfected and those within 50 feet of any source of water supply should be filled and relocated.

The hotel privies should be cleaned, disinfected and filled and reconstructed.

The ditch and its banks which parallel the T. & O. C. R. R. should be cleaned.

There should be a general and regular removal of garbage and rubbish.

AVONDALE.

The hotel privies should be cleaned and screened.

The dump on the lake front should be abandoned and cleaned.

PATTERSON'S.

The privy located on the lake shore should be reconstructed at a suitable location.

THORNPORT.

All privies should be removed from the lake shore and reconstructed at a suitable location.

The dumping grounds should be abandoned and cleaned and other dumping grounds should be secured at a suitable location.

Special Recommendations.

It is recommended that the authorities controlling Buckeye Lake Park be furnished with the findings of the Board, based on an inspection of the sanitary conditions as outlined in the foregoing report, and that they be furnished a copy of rules for constructing and maintenance of privies to be applied where the abandonment of privies is impossible.

It is also recommended that the proper local health officials be notified of the findings of the Board and instructed as to the proper procedure in abating the existing nuisances and in improving general sanitary conditions.

It is also recommended that the authorities in charge of Buckeye Lake Park be informed that the Board will require the submission of plans for a comprehensive improvement in sanitary conditions, especially as regards the disposal of sewage before the October meeting of the Board, 1912.

REPORT ON AN INSPECTION OF SUMMER RESORTS AT INDIAN LAKE.

Indian Lake (Lewiston Reservoir) is located in the northwestern part of Logan County at the headwaters of the Miami River. The water area at the present time, formed by constructing a dam across the Miami River and throwing up embankments across the adjacent lowlands, is 6,134 acres. It was created a public park by act of the General Assembly in 1898, and the name Indian Lake was adopted. The country surrounding the lake is generally thickly wooded and many beautiful spots have been developed into summer resorts by the construction of a large number of cottages, and at certain locations by the maintenance of summer hotels. The most important resorts on the lake are Russel's Point, Lake Ridge, Lakeview, Orchard Island, O'Connors, The Wedge, Turkey Foot, Sandy Beach, and a number of small resorts where but a few cottages are located. The lake is noted for its fish and many fishermen frequent the different resorts. A large number of people have constructed summer cottages, which are occupied during practically sever

months of the year. Transportation facilities are afforded by an electric line operated by the Ohio Electric Company and the T. & O. C. Railroad. The summer population is fairly constant, there being but a small increase at the time of excursions which usually occur on Sunday.

RUSSEL'S POINT.

Russel's Point is composed of two leases and is sometimes designated as Bundy's Landing and Prater's Landing. Russel's Point is probably the most important resort on the lake. There is one hotel, three grocery stores, several restaurants, and a large number of cottages, which house on a conservative estimate, 2,000 people. The hotel, which is comparatively a small building, as well as practically all the cottages, are well screened. One grocery was observed which was not screened. The sanitary conveniences at the hotel, however, are inadequate and the general sanitary conditions are bad. No inside closets are provided for the hotel or any of the cottages. Privies are in general use. The water closets used by the male guests at the hotel were in a very filthy condition at the time of the inspection. The feces and urine fall or are drained directly into the lake. There is no screening and the seats are filthy, being encrusted with feces and foul with urine. Two swimmers were in the water within a distance of about 60 feet of the privy at the time of the investigation.

The water supply at the hotel is obtained from a drilled well located 10 feet from the hotel and about 50 feet from the lake and the water closets described above. The well is approximately 140 feet deep, and is subjected to the polluting influences of not only drainage from the water closets but also from leachings from manure piles located beside a barn within 100 feet of the well.

A high board fence is placed in the rear of the hotel enclosing a small area which is used as a chicken pen. Barrels for the deposition of garbage are also placed within this area. An old broken barrel was observed near the barn, which was partly filled with chicken feathers and entrails. It was unscreened and swarmed with flies. A small duck pond, containing only one or two fowls, was located within 15 feet of the well.

There is a water closet for women in connection with the dancing pavilion, just a short distance from the hotel and on the opposite side from the one which is used by men. This is said to be watertight and well screened.

The cottages which are located at Russel's Point are built along two roads or streets. There is no sewer, so that privies are used entirely and in the large majority of cases these are the most primitive kind, being loosely constructed and set directly upon the ground. In most cases no vault has been constructed. No screening was observed in any case, and in some instances the conditions were very insanitary and objectionable. It is hard to understand why people will allow conditions at a summer

resort which would not be tolerated at their homes. The privies are set a short distance from the cottages, ranging from 5 to 50 feet, and in some instances they are crowded close to the street. The odor from them was very noticeable and a large number of flies are attracted.

Water for use at the cottages is drawn from wells four or five in number which are located at various points. The wells are well encased but only one instance was observed where a suitable curbing was provided. One well located on the Bundy lease is within 50 feet of four water closets. A well on the Prater lease was well protected from surface wash, but was in close proximity to several houses. Two houses were located within 50 feet of the well. The wells are approximately 150 feet deep.

In a few instances, especially on the Prater property, there may be seen well kept garbage pails, but this is unusual. Some throw their garbage out of the windows, others into the lake, while others carry it a respectable distance from the cottages where it is thrown into the weeds and left to form a breeding place for flies. There has been no provision made for the collection or deposition of the garbage. For a time farmers living in the vicinity would collect the garbage in wagons and cart it to their farms to be used as a food for swine. Owing to the fact that the cottagers are not particular as to what is thrown with the garbage, and in many cases throw broken bottles or glassware into the pails, the farmers no longer care for the waste for feeding purposes.

A stagnant pool located on a piece of low ground immediately to the rear of the dancing pavilion, and which extends beneath the pavilion and a restaurant nearby, is used as a common dump. Much rubbish, including waste paper, tin cans, store boxes, and ashes, in addition to garbage, is thrown into the pool. The conditions are very objectionable and the pool should be filled owing to the fact that drainage is impossible, since the elevation of the ground is lower than that of the surface of the lake.

Ice is secured from the surface of the lake in winter and retailed to hotels, cottages, etc., in the summer. It was stated that it was used mostly for cooling purposes, and that it is not generally placed in beverages or food. It was observed, however, that ice was placed in the iced tea at the hotel.

Milk is secured from one distributor and is delivered in capped bottles. Many of the summer visitors use condensed milk.

LAKE RIDGE.

Lake Ridge is located on the eastern edge of the lake and near what was originally Indian Lake. A large hotel, together with approximately 30 cottages, have been constructed at this point. It is very quiet and but few excepting regular summer visitors visit the resort. The water supply is obtained from a drilled well placed in the bottom of an old dug well. The water is pumped to the hotel by means of a wind mill. The well is

about 30 feet distant from the hotel and there are no visible sources of contamination.

The water closets provided for the hotel as well as at the cottages, are all constructed over an arm of the lake and all offal is discharged directly into the water.

The general sanitary conditions surrounding Lake Ridge may be said to be very satisfactory, the only objectionable feature being the location of the water closets.

O'CONNOR'S.

The O'Connor resort is comprised of an old farm house, which has been converted into a hotel, and possibly twenty cottages. Practically all of the cottages are owned by Mr. O'Connor. The water closets are constructed along the edge of the lake so that all wastes are washed directly into the water. Garbage from the cottages in many instances is also thrown into the lake.

ORCHARD ISLAND.

Orchard Island is leased and operated by the Orchard Island Improvement Company. A hotel with possibly thirty rooms, a small number of cottages, and a pavilion, which is used for Chautauqua purposes, have been constructed. At the time of the inspection several organizations of the Boy Scouts and the Old Guard were encamped near the Chautauqua grounds. The general sanitary conditions about the place were good. The garbage is well taken care of and the hotel and cottages are provided with water closets. The water closets are unsatisfactory in that they drain directly into the lake. But one water closet has been provided for the guests at the Chautauqua grounds and both men and women are compelled to use the same building. This fact causes continual defecation in the grove and woods surrounding the grounds.

SANDY BEACH.

Sandy Beach is located on a very small island in the center of the lake. The island is completely covered by a building which is used as a bath house and restaurant. Two closets are provided with removable trays in which the deposits are carried to the shore and buried. Garbage is also deposited in pails and removed to the shore. A restaurant and bathing beach are operated at this point. It was stated by residents at Russel's Point that practically all bathing was done at Sandy Beach.

POTTER'S LANDING.

Potter's Landing is located on the south shore of Indian Lake, immediately west of Russel's Point. It is a private park and contains ten cottages, all of which are well screened. The water supply is obtained from a driven well 50 feet in depth and cased to the bottom. The protecting casing is in good condition and the nearest source of pollution

is 150 feet distant. Two privies, one for men and one for women, serve the inhabitants of the cottages, and are located 150 feet from the well. Said privies are not screened and the vaults consist of rectangular holes 2 feet wide and 3 feet deep dug in the ground. No inside lining is provided. These privies were fairly clean and the fecal matter had been removed two weeks previous to the examination. The privies were then moved, the vaults lined, filled and another excavation made. Two privies located within the ground and on the edge of two stagnant ponds have been abandoned. However, these have not been cleaned and residents nearby have complained of foul odors arising from them. The garbage is kept in pails and boxes placed either within the back screened porches or on the outside. Covers are provided for some, but for the most part the receptacles are uncovered. The garbage is collected twice a week, and is spread upon the ground for the benefit of over 100 chickens. The nearest house to this dumping ground is 150 feet distant. No bathing is permitted on the beaches and there are restrictions against throwing garbage and rubbish into the lake. The park has a neat appearance and is well kept.

THE WEDGE.

The Wedge is located on the south shore and contains ten cottages and a grocery. The water supply is derived from two driven wells, cased their entire depth of 50 and 70 feet. Eight privies are provided and the vaults consist of rectangular excavations in the ground. None are lined. A double privy situated adjacent to the grocery store is but 15 feet distant from one of the wells whose protecting casing is in a bad state of repair. This privy and well are located on the low land between the road embankment on the north and the Ohio Electric track embankment on the south. During heavy rains this section is flooded and possible contamination of the water supply is highly probable. The other well is located on high ground with all surface drainage flowing in a direction away from the well. These privies are not screened and are infested with flies. Garbage boxes and pails are provided, the covers of which are in some cases cloth and in other cases wood, a few being covered and the others not. Swarms of flies infest the surroundings. The garbage is collected twice a week and burned. Bathing is permissible at the beach, which is strewn with papers, wood and some garbage. A heavy deposition of scum is noticeable at this place. Food supplies are obtained from the grocery, which is well screened. On the whole the Wedge showed poor sanitary conditions and ill kept premises.

THE BULKHEAD.

The Bulkhead contains a hotel, two cottages, a grocery store and a boat landing. The hotel is screened with ordinary screens; two unscreened privies are provided with unlined vaults. Garbage is kept in

uncovered cans at the back entrance of the hotel and is collected twice a week and fed to hogs. The south branch of the Miami River flows within 250 feet of the hotel and it is this stream that receives the fish entrails. Within three feet of the wooden bridge crossing this stream, a half dozen fish heads could be seen. The water supply is obtained from deep wells having artesian flow and are cased to full depth. One of the privies is situated within 50 feet and the garbage cans within 20 feet of one of these wells. Bathing is permissible here and the beach presents a fairly clean appearance.

COTTONWOOD.

This summer resort consists of seven cottages, a hotel and grocery, all of which are well screened. Two privies are provided for all the residents. The men's privy is of the earthen vault type, while the other is located on the edge of the lake and all fecal matter discharges directly therein. Neither is screened. Garbage is kept in uncovered pails and the frequency of its removal and the general disposition made thereof could not be ascertained due to the attitude taken by the proprietor. No bathing is permitted here and the shore was covered with scum at this point. The water supply is derived from a driven well 86 feet in depth and cased the entire length. The nearest source of pollution is the above mentioned privies located 150 feet distant.

EDGEWATER.

Edgewater contains twenty cottages, one club house and a hotel, all of which are well screened. The water supply is derived from three driven wells which are cased their entire depths of 85, 132 and 188 feet. Six unscreened privies are provided and have unlined vaults. Garbage which is kept in pails and for the most part covered is collected twice a week and fed to the hogs. The privies are located 300 feet or more from any well. Bathing is permissible and the beach is quite clean. A flock of sheep is kept within the grounds and keeps the grass closely cropped. On the whole the sanitary conditions and general appearances were of the best.

TURKEYFOOT POINT.

Posted in conspicuous places throughout the resort may be seen the following sign: "Notice to Turkeyfoot Cottage owners and campers. That all refuse, cans, bottles, paper and other rubbish that may accumulate *must* be cleaned up and surroundings and locations kept in a sanitary and respectable condition at all times. Signed, I. N. Buller." At this point there are some fifty cottages and a grocery store. The majority of these cottages are maintained by various hunting, fishing and social clubs and are for the most part only inhabited on Saturdays and Sundays. Nine privies are provided of the earthen vault type and unscreened. One of these empties almost directly into the lake. These privies are cleaned

once a month and the fecal matter is disposed of at distant farms. Garbage is kept in uncovered pails and is collected at varying intervals and fed to hogs. The water supply is derived from a driven well 105 feet in depth, provided with 3-inch casing for its entire length and is pumped by means of a windmill. No bathing is permitted at the beaches and the shores show an accumulation of heavy scum. The appearance of the place is not in the least inviting and no attention is paid to the above notice.

SASSAFRAS POINT.

This summer resort consists of about eighteen cottages and a grocery store. Two wells each 75 feet deep, cased their entire length with 3 inch casing, supply the water for the resort. Eight privies are provided, all of which are unscreened and discharge directly into the lake. No bathing is permitted here and the beaches were in a most insanitary condition and were undoubtedly the worst visited. Garbage is kept in uncovered boxes, pails and tubs, and is collected bi-weekly and fed to hogs. The residents of this place have complained of the insanitary condition to the guardian, Mr. C. L. Spencer of Xenia, owner of this point, but by this method have failed to improve conditions in any way.

LAKEVIEW PARK.

This resort is situated just west of Lakeview and consists of about twenty cottages, the greater number of which are privately owned. The water supply is derived from a 2 inch driven well 250 feet deep and cased the entire depth. Another well furnishes water for scrubbing, etc. This is a dug well 20 feet deep and although notice has been given that this water should not be used for domestic purposes it is the opinion of some that it is used in some instances for drinking and cooking. Privies at this resort consist of vaults of the earthen type and of those inspected but one had inside lining. A ladies' double privy owned by Mr. Henaur, a Columbus citizen, is provided with no vault whatsoever, discharging directly upon the surface. The rear of this privy is open and infested with flies. There are about eight privies on the grounds and all are unscreened. One of these privies is situated on the edge of the State ditch and drains into it. Garbage at some of the cottages is kept in boxes and pails, which for the most part are uncovered. Paper, rubbish, bottles, tin cans, and some garbage is scattered in all directions. The garbage is collected twice weekly and is hauled to distant farms and fed to hogs. Food stuffs are purchased in the village of Lakeview where the groceries are kept in fair condition.

Recommendations:

From the foregoing report it may be seen that none of the foregoing resorts examined at Indian Lake are provided with either a public water supply or a sewerage system. The water supply is obtained from

a number of private wells. Water closets are provided at the hotels and at practically all the cottages. The water closets are poorly constructed and where possible are located upon the edge of the lake so that all offal will be discharged into the water. A decided nuisance is created by the proximity of the closets to the cottages. No systematic method of collection or disposal of garbage is provided. The wells are not sufficiently removed from sources of contamination so that the quality of the water may not be impaired. It would be advisable to locate wells at greater distances from water closets and cottages, and to construct all water closets with watertight vaults.

Privies located on the lake shore should be removed 50 feet from the lake.

All privies should be provided with concrete vaults which should project one foot above ground and should be properly screened to prevent the breeding of flies.

No one should be permitted to throw rubbish of any kind into the lake or stream.

Covered garbage receptacles should be provided and the garbage should be collected and properly disposed of by incineration or burying, at frequent intervals.

The practice of bathing in the lake should be discouraged until sanitary conditions have been improved.

REPORT OF AN INSPECTION OF THE GROUNDS OF THE MIAMI VALLEY CHAUTAUQUA ASSOCIATION.

The Miami Valley Chautauqua Association grounds are located in Montgomery and Warren Counties on the west bank of the Great Miami River, fourteen miles south of Dayton. The Association owns about 125 acres of land, forty of which are used for the permanent buildings, cottages and tents. The normal population during the twenty-five days of the meeting is about 3,000. On Sundays the number present will average about 10,000. The meeting ordinarily opens about the middle of July and continues twenty-five days.

The permanent buildings consist of an auditorium, two office buildings, three hotels, grocery, pump house, and a building in which are lavatories for men and women. There are also eighty cottages constructed of wood, stone or cement.

Of the normal population 2,500 are taken care of in the tents erected on the grounds and 500 in the hotels and cottages. The tents are used during the session of the Chautauqua but the cottages may be occupied from May to October.

Water Supply. Water is supplied for all purposes by twelve driven wells with hand pumps located at convenient places about the grounds,

and by one drilled well from which water is pumped to buildings through pipes laid on the surface of the ground. So far as could be learned no examination had been made to determine the quality of the water.

Sewerage. The only sewer observed is one leading from the general toilets. This sewer is constructed of sewer pipe and has an outlet into the river below a dam and below the lower end of the grounds.

Privies. As stated there are two privies for general use. These are located near the center of the grounds. Under the building and above the ground are two lines of sewer pipe to which standpipes in stalls are connected. These two lines of sewer discharge into the sewer above mentioned. The seats are made of boards similar to those found in ordinary privies. No means of flushing these standpipes is provided although there is a continuous flow of water through the urinal and the sewers coming from the water distribution system. An odor was noticeable in the immediate vicinity.

Twenty private vaults are provided for the accommodation of those staying in cottages and one for one of the hotels used only as a rooming house. These vaults are of cement, sides and bottom, and said to be water tight. No objection could be found to these vaults or the surroundings.

Garbage and Refuse. All garbage is collected in large cans placed at frequent intervals in that part of the grounds occupied by the cottages and tents. Most of these cans were covered with properly fitted metal lids but in a few cases open cans were found. It is stated that each morning these cans are emptied into a wagon and the garbage is hauled below the dam and dumped into the river where there is a sufficient current to carry it down stream. The hotels are provided with barrels for garbage and slops. These barrels were not covered. In the rear of the Bellevue Hotel objectionable conditions were found caused by uncovered swill barrels and throwing slops on the ground. Open barrels are furnished for waste paper and dry refuse.

Screens. Most of the buildings have screens for doors and windows but these are not all in the best of condition.

Food Supplies. As the grocery was closed no observation could be made as to the manner of handling or protecting food supplies.

Bathing. The most objectionable feature in connection with this place is the bathing. The river, impounded as it is by a dam located but a short distance below the grounds, furnishes an ideal place for boating but when you consider that the Miami River at this site has received all of the sewage of Dayton, Springfield, Piqua, Miamisburg, Troy, Sidney, Greenville and a large number of smaller communities, and also millions of gallons of wastes from paper mills and other manufacturing industries, it can hardly be considered as ideal for bathing purposes. That thoughtless people do not take this view, however, is

attested by the statement that four or five hundred people use the river for bathing each day. Boating and bathing are not permitted on Sunday.

Recommendations:

1. The standpipes in the general toilets should be provided with flush tanks and modern bowls. These toilets would be much improved if better lighted.
 2. All garbage cans and swill barrels should be provided with close fitting lids and should be kept covered.
 3. Throwing slops or garbage onto the ground should be absolutely prohibited and it should be made the duty of some official to see that the order is obeyed.
 4. The practice of dumping garbage into the river should stop. This is not only insanitary but a direct violation of the statutes. Garbage should be disposed of by burial or in some other sanitary manner.
 5. Instead of encouraging bathing in the Miami river, notices should be posted calling attention to the fact that the water is badly polluted by sewage and other wastes and it is not suitable for bathing purposes. Printed matter descriptive of the Chatauqua should make a correct statement in regard to bathing in the river.
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RULES FOR CONSTRUCTION AND MAINTENANCE OF PRIVIES IN
SUMMER RESORTS NOT PROVIDED WITH SEWERAGE.

1. All privies shall be provided with *watertight* receptacles and should be so placed that all fecal matter is discharged into them.
2. The receptacles in which fecal matter is contained shall be entirely enclosed in a suitable compartment under the seats. Such vaults should be made of brick with a concrete lining, or wholly of concrete. The walls should have a well covered cleanout extension at the rear. The vault should not continue or extend under any part of the flooring save the seat, and should be so constructed that it is easily accessible for inspection and cleaning. The privy should be screened and so constructed as to exclude flies and vermin. The addition of a suitable vent pipe extending 3 feet above the roof and windows to allow for ventilation, light and sunshine is recommended.
3. All seats shall be provided with *hinged* covers which will not remain open unless held in this position.
4. An ample supply of powdered slaked lime or dry loamy earth shall be accessible for sprinkling over the fecal matter after each use of the privy.
5. As soon as *full*, receptacles shall be emptied and the material *removed at least one-fourth of a mile* from a built up community and buried in the ground.

6. It shall be the duty of the health officer or his representatives to inspect all privies *not less frequently than once in two weeks*, and to prosecute persons found not complying with the above rules.

7. Where public privies are maintained for different sexes they shall not be located nearer than 40 feet of each other unless separated by a high tight board fence, and in no instance shall they be nearer than 10 feet of each other.

REPORT OF AN INSPECTION OF SUMMER RESORTS AND BATHING BEACHES ON LAKE ERIE.

BEACH PARK, AVON.

This resort is within the incorporated village of Avon and is the property of the Lake Shore Electric Railway Company. There is a large dancing pavilion in which meals and lunches are served, a bowling alley, and some minor amusement buildings. There are extensive grounds, used for picnic purposes, and a residence for the caretaker, where a very few boarders are taken. At the beach is a small house used for a residence by the person having boats to let. The grounds adjoin the power plant and car barns of the railway company. The pavilion and grounds are operated by a lessee.

Water Supply. Water pumped from the lake is supplied to the buildings and over the grounds. The supply is furnished from the power plant and is subject to some nearby though slight contamination. Water from this source is also used on cars for drinking purposes.

Sewers. Sewage is discharged into the lake near this point from the village of Avon, from the power plant and car barns and from the pavilion in which are located the water closets and urinals. The outlet for the pavilion sewer is not more than three or four feet from the ground surface and all of the sewage runs over the face of a bluff and on to the beach. The toilets were reasonably clean but there is not a sufficient number for the accommodation of the number of people said to patronize this place.

Privies. Only one privy was found. This is located in a ravine near the bathing beach and was exceedingly foul. There was no evidence of leaching into the stream in the ravine but this no doubt takes place as the rock is only a few feet from the surface.

Garbage. The garbage is said to be disposed of by hauling it away from the pavilion and covering it with lime. There was no evidence of garbage on the ground or along the beach.

Bathing Beach. There is a fairly good bathing beach but the investigator was informed that it is not much used. The grounds have been used but a few times during the summer for large picnics, the main feature being the dancing pavilion which is used on Saturday nights and Sundays.

Recommendations.

The privy vault in the ravine should be abandoned and thoroughly cleaned. If it is necessary to have a privy vault at or near the present location a watertight vault should be constructed, with proper super-structure.

In order to protect the bathing beach the sewer outlet for the pavilion should be abandoned and the sewage properly disposed of or a system of sewers should be devised to include sewage from the pavilion, from the power house and car barns, and from the village of Avon, with a suitable method of disposal.

LORAIN.

At Lorain are located Glen's Beach, Century Park and the municipal bathing beach. These beaches are all within the influence of the break-water for Lorain harbor and undoubtedly receive much sewage pollution.

At *Glen's Beach* is a large pavilion for dancing and also a bowling alley. A few boarders are taken during the summer. The buildings are connected with the water supply and sewers of the city.

Bathing Beach. At the time of inspection the water was covered by a thick yellow scum but several children were in bathing. The beach is said to be well patronized.

At *Century Park* is a dancing pavilion but the beach is little used.

The *Municipal Bathing Beach* is located west of Black River and near the water filtration plant. This beach is used to some extent but in addition to the objections above mentioned is objectionable on account of the discharge of washings from the filters.

Recommendations.

These beaches should be abandoned until the sewage discharged into the lake at this point is adequately purified. The municipal beach and Glen's Beach are particularly objectionable.

LINWOOD PARK, VERMILION.

This park is located within the village of Vermilion and but a short distance from the mouth of Vermilion River. The park is owned and operated by a stock company representing three church denominations. The park consists of about 60 acres for the most part heavily wooded. The soil is a heavy black loam that holds moisture longer than is desirable.

On the grounds are two hotels and about 80 cottages with a normal population during the season of from 500 to 600.

Water Supply. The water supply is said to be taken from the lake by means of infiltration cribs, but former examinations by the Board show that much of this supply comes from ground sources as the water

is much harder than the lake water. The water is said to be of good quality and this is borne out by analyses made in the Board's laboratories.

Sewers. It was stated that the hotels and all cottages are sewered to a common outlet into the lake. That sewage is being discharged into the lake is in evidence as a break in the sewer was noticed at the shore end of the dock. From the shore the sewage is carried through an iron pipe to the end of the dock.

Garbage. Garbage is collected in cans and hauled to farms.

Buildings. All buildings appeared to be in good condition and were screened, although many of these screens were observed to be in poor condition.

Bathing Beach. The bathing beach is much better than at many of the resorts and is said to be building very rapidly. Aside from the sewage pollution observed at the shore end of the dock there was no evidence of pollution. This beach is extensively used.

Recommendations.

A pressing need is for underdrainage of the park to provide for rapid absorption of moisture after rains. There should also be installed a suitable method of sewage disposal to prevent contamination of the beach.

CRYSTAL BEACH, VERMILION.

This resort is within the village of Vermilion and is a few hundred feet east of Linwood Park. It is strictly a picnic ground as no one resides on the premises except the employees. A large dancing pavilion, bowling alley and other amusements are housed in buildings closely grouped. The grounds are well drained.

Water Supply. Water is pumped from the lake and distributed to the buildings from a storage tank.

Sewers. The buildings are all sewered to a common outlet into the lake at a dock located at the west end of the grounds. There was a decided sewage odor at and near this dock and this would be much worse when the grounds were in use. At the time of inspection no one was on the grounds except the employees.

Privies. No privies were found. Public closets connected to the sewer are provided for the use of visitors and employees.

Garbage. There was no evidence of garbage except near a small building near the dock, occupied by some of the employees. Here garbage had been thrown over the bluff on to the beach. Garbage and refuse are removed from the grounds.

Bathing Beach. This beach is building rapidly as is shown by the location of a toboggan slide which, although extended an additional 25 feet, has had to be abandoned. On days when the grounds are occupied by picnic parties the beach is much used. There is some pollution from sewage coming from the sewer above mentioned.

Recommendations.

As there is abundant opportunity for contamination of the bathing beach by sewage from the buildings and public toilets, some method of purification of the sewage should be installed. Measures should be enforced for the care of garbage so that none of this material will reach the beach or be allowed to remain near the buildings.

RUGGLES GROVE.

This resort is located between Vermilion and Huron and adjoins Mitiwanga. The property is owned by Mr. Charles Ruggles. The grounds are used extensively by picnic parties but there is an hotel for the accommodation of boarders. There is also a dancing pavilion and bath and boat house. Space is also rented for tents and at times a considerable number of people live in this manner. A small number of cottages are in the immediate vicinity and form part of the community. Probably 200 people are on these grounds each day during the summer and at times a much greater number.

Water Supply. Water is supplied from two infiltration cribs on the lake shore and is pumped to a tank and distributed to the various buildings and over the grounds.

Sewers. The buildings are sewered and sewage is discharged into a system of underground tanks not open for inspection. No one was found who could give information as to construction. It was stated that the effluent is discharged into a line of subsurface drains. There was no odor of sewage in the vicinity of the plant. The toilets in the pavilion were extremely dirty and foul smelling, giving evidence of lack of care. As the inspection was made early in the morning this condition of affairs can only be attributed to neglect. Plumbing in these toilets needs attention.

Garbage. Garbage is collected from the hotel, pavilion and cottages and hauled away.

Bathing Beach. There was no evidence of sewage or garbage pollution along this beach. The beach is well patronized, due somewhat to the operation of a large bath house which is kept in good condition.

Recommendations.

The owner of this resort should see that toilets are kept in a sanitary condition both as to working condition and cleanliness.

MITIWANGA.

The resort known as Mitiwanga is located about half way between Vermilion and Huron. The grounds have been platted and lots have been sold to persons who have built cottages. The management is under the control of The Mitiwanga Association. There are about thirty cottages and lodging houses, used by some two hundred people.

Water Supply. Water for drinking purposes is taken from two

drilled wells. Owing to the insufficiency of the supply many are driven to using water from cisterns, and no doubt the lake water is used to some extent. Water for toilet and bath purposes is taken from the lake and distributed from a storage tank. The intake for this supply is about 100 feet from shore.

Sewers. Sewage is collected from all the buildings and discharged through a main sewer into a collecting tank located at the foot of the bluff and near the center of the beach. From the tank the sewage is discharged into a system of underdrains laid in the sand near the foot of the bluff. Approximately two thousand feet of underdrains have been laid. The inspector was informed that joints in the tile were covered with canvas to prevent entrance of sand. On the day of inspection there was no odor of sewage near the tank nor any evidence of sewage or other pollution on the beach. However, persons were interviewed who stated that at times there is a considerable odor from the tank and from sewage finding its way to the surface of the sand.

Privies. Only one privy was found and it was stated that this is used only during the season when the waterworks is not being operated.

Garbage. Garbage is disposed of by using cans and is collected and hauled to the country every other day, to be fed to hogs or dumped.

Bathing Beach. There is a good beach at this place and an effort is being made, by the use of breakwaters, to prevent scouring. At the time of inspection there was no evidence of sewage or garbage on the beach.

Recommendations.

There is a most pressing need for an increase in the water supply for domestic use. The two wells now used are entirely inadequate and steps should be taken, before another season opens, to provide additional wells that will furnish a supply suitable as to quantity and quality.

The method of sewage disposal should be supplanted by a method devised along sanitary and scientific lines. The method now used is susceptible to criticism.

RYE BEACH.

This resort is west of Huron and about seven miles from Sandusky. It consists of a grove of about 30 acres which was platted by the owner and lots sold. A large section in the center of the plat was reserved as a picnic ground for the benefit of the cottagers. Some forty cottages have been built and these are occupied by approximately 300 people. The buildings are all new and are screened.

Water Supply. Water for domestic purposes is supplied by four wells. Three of these are drilled and the other is supposed to be supplied by water from the lake filtered through a trench some 500 feet in length, filled with sand and gravel. None of the cottages are provided with baths or toilets.

Sewers. There are no sewers. Some tile have been laid for land drainage but these drains are used for no other purpose.

Privies. A privy has been constructed for each of the cottages with two large ones for public use. These privies are constructed by setting up two sections of large sewer pipe on a cement foundation. The top section of pipe is at or a little above the surface. None of these privies are screened. The privies for the group of cottages on the west side are set on a line at the extreme western boundary of the resort and are thereby removed a considerable distance from any of the cottages. The privies for the cottages on the east side are in the rear of the cottages. The public closets are near the center of the grounds and are supplied with cement vaults. No particularly bad conditions were found except at the public closets. The odor about these was very objectionable. It was stated that all vaults are thoroughly cleaned at the end of the season.

Garbage. Garbage is collected every other day and hauled away for feeding to hogs. Metal cans with lids are supposed to be used, but some containers without lids were noticed.

Bathing Beach. There is a good beach and no evidence of sewage or garbage pollution was found.

Recommendations.

A system of sewerage with proper disposal should be provided so as to allow the abandonment of all privy vaults. It is very essential that immediate steps be taken to provide better sanitary conditions about privies, especially those used by the public. By the free use of a disinfectant, such as lime, conditions could be much improved. Steps should also be taken to see that metal cans with tight fitting lids be provided for garbage.

PUT-IN-BAY.

This resort is not as well patronized by summer visitors as was the case some years ago, due largely to the abandonment of the Hotel Victory. Four rather large hotels located within the village of Put-in-Bay still have a number of visitors, but the day excursionists constitute by far the largest number. There are a number of boarding houses and many of the residents take boarders.

Water Supply. The public water supply is taken from the lake near the southeasterly shore. Water is supplied to all the hotels but is not in general use in residences. Private wells are used to a considerable extent. These wells are dug or driven into the limestone and no doubt many of them are subject to pollution from many privy vaults still in use.

Sewers. Public sewers have been installed for carrying sewage from the central part of the village. There are also some private sewers discharging into the bay and in many instances there is evidence to show that suitable points of outlet for these sewers were not chosen. The sewer system is not available for general use.

Privies. Privies are still used where sewers are not accessible. Many of these were observed to be in poor condition, notably those for public use. A modern comfort-station connected to a sewer and for use by women has recently been constructed in the park.

Garbage. Garbage from hotels and some cottages is collected by farmers and used for pig feeding. The collection of garbage is not systematic and is done at the expense of the property owner. All sorts of receptacles are used. Garbage not gathered by farmers is hauled out of the village and dumped. A considerable amount of garbage is fed to chickens, of which there are a large number in the village.

Bathing. The bathing beach is on the easterly side of the island and so far as known no sewers empty on this side. There is some bathing in the bay. This is undesirable not only on account of sewage discharged into the bay but because of the immense amount of filth thrown into the bay from the boats. The shore of the bay was littered with garbage and rubbish and there was also evidence of sewage pollution.

Recommendations.

Recommendations for bettering sanitary conditions at Put-in-Bay have been made so often that the former recommendations approved by the Board can only be repeated. There is most pressing need of the installation of a comprehensive sewerage system, with a sewage disposal plant or an outlet into the lake at a point where a current will be found to carry sewage away from the island. This should be followed by compulsory connection to the sewerage system and the abandonment of all cess-pools and privy vaults. After abandonment these should be thoroughly cleaned, disinfected and filled with clean earth or ashes. The public water supply should also be made available for general use and a systematic plan for handling and disposing of garbage should be instituted.

MIDDLE BASS.

On the westerly point of the island is a group of some twenty-five cottages and the "Club." Probably not more than 150 people are at this resort at one time as it is out of the way for excursionists.

Water Supply. Water is supplied to the "Club" from a tank to which water is pumped from the lake. Wells are in use to supply cottagers.

Sewers. There is no system of sewers. It is stated that a small sewer carries wastes from the "Club" to the lake.

Privies. The cottages are supplied with privies maintained in good condition.

Garbage. Garbage is hauled inland for feeding.

Bathing. There was formerly a bathing beach but this is not much used at present.

KELLEY'S ISLAND.

Kelley's Island constitutes an incorporated village. As a summer resort it is not much used. There are three small hotels and a number of cottages on the south shore of the island but probably not more than 150 summer visitors are present at one time.

Water Supply. The water supply for the section of the village in which cottages are located is taken from the lake at one of the docks and distributed from a tank. Some private wells are used and also a number of cisterns. The main source of possible contamination would come from boats at the dock and from closets built on or near the dock.

Sewers. Not much information could be obtained in regard to private sewers. There is no public sewer system but there are, no doubt, some private sewers discharging into the lake on the south side of the island.

Privies. Cesspools and privies are in general use. As a rule these are poorly constructed and are a menace to the shallow private wells and cisterns which are not watertight.

Garbage. Garbage is collected for feeding. There is no systematic collection or regulation as to the containers used.

Bathing. The only bathing beach on the island is on the opposite side from the residence portion. Formerly a bus was used in getting to the bathing beach but owing to lack of patronage the bus line was discontinued. The beach is but little used at this time.

Recommendations.

As there is little prospect of the installation of a sewerage system, it is essential that the requirement of the Board that a pure water supply be provided be followed at an early date. The general use of a public supply, adequate as to quantity and quality will make possible the abandonment of wells and cisterns as a source of supply.

LAKESIDE.

This is one of the oldest resorts on the lake and is operated by the Lakeside Campmeeting Association. There are some people who permanently reside at Lakeside, but the greater number of the cottages are closed except during the season which opens about June 15th and closes about September 1st. During the assembly, conference and campmeetings, held this year from July 4th to August 27th, several thousand people were on the grounds each day. There is one large hotel and some 600 cottages, all of which seem to be in reasonably good condition.

Water Supply. The public water supply is taken from the lake, the intake being located some 200 feet from the shore. The water is filtered in a modern filtration plant installed in 1911. An experienced operator is in charge of the plant and good results are being secured. There is some

objection to the filtered water owing to its not being as cold as well water and a considerable amount of water is taken from wells and from cisterns for drinking purposes.

Sewers. Lakeside has never had a comprehensive system of sewers. Sewers have been constructed for part of the property with an outlet into the lake at the extreme western boundary. Sewage is supposed to pass through a tank where some sort of purification is expected, but from the appearance of the water and the shore near the outlet it is very evident that little or no purification is effected.

Buildings. The buildings seem to be in good condition. The most objectionable condition was found in the wing of the hotel said to be occupied by employes. This wing is located within a few feet of a stable. Many panes of glass in the windows are broken and windows are not fitted with screens. Numerous flies were about the stable and these flies must gain access to the building. The stable is not sanitary and as built cannot be made so.

Privies. All of the cottages not accessible to the sewers, and these constitute a great majority, maintain privies or cesspools. Many of these were observed to be in bad condition and in need of cleaning. The superstructures in many cases were very dilapidated.

Garbage. While the regulations of the Association provide for the use of metal cans with covers, this regulation is not generally observed. Any sort of a receptacle that will hold garbage is used. The garbage is collected daily except Sunday and is hauled away for feeding, sold to farmers, and some of it is also dumped at a distance of about a mile from the grounds and covered with lime.

Bathing. Not much bathing is done in the lake on the Lakeside shore. Those wishing to bathe must go in a boat to Sandy Beach, some distance to the west. Sandy Beach was not inspected but the inspector was informed that there are no houses or sources of pollution near the beach.

Recommendations.

A comprehensive system of sewers, accessible to all the property under the control of the Lakeside Campmeeting Association, with an efficient method of disposal should be provided. Such installation should be followed by the abandonment of the present outlet and of all privy vaults and cesspools.

It would be advisable to remove the stable now located near the hotel and to repair and provide good screens for the windows and doors for the wing of the building occupied by employes.

ERIE BEACH.

This resort is immediately west of Lakeside, being separated from the latter by a fence. There are a few buildings for amusements but no cottages.

Water Supply. Water is taken from the lake for use in toilets.

Sewers. The pavilion is sewered. The sewage is supposed to discharge into the sewerage system of Lakeside but the inspector was informed that the sewer from this building is carried through the Erie Beach dock and discharged into the lake. The sewage from Lakeside discharges along the side of the Erie Beach dock and creates very objectionable conditions.

Bathing. Formerly there was considerable bathing at Erie Beach but this has been discontinued.

Recommendations.

If a sewerage system is installed at Lakeside arrangements should be made, if possible, to discharge the sewage from Erie Beach into said system. If such arrangement cannot be made an independent disposal plant should be provided. At present sanitary conditions cannot be improved until there is a decided improvement in the method of disposing of the sewage of Lakeside.

CEDAR POINT.

This resort is located on the point that forms the eastern boundary of Sandusky. It is owned and managed by a private corporation and is the most popular resort on the lakes. During the season many conventions are held here and these in addition to summer residents and day excursionists bring the daily population to several thousand. The "Breakers" is one of the largest hotels in the country and is said to have 1,000 rooms. There is also a hotel known as the "Whitehouse." Such amusements as exist at the large summer resorts are found here. There are a few small cottages for rent.

Water Supply. Water is taken from Lake Erie near the end of the Eastland dock. The water is treated by mechanical filtration and is in general use for all purposes. As far as could be learned this is the only source of water supply.

Sewers. All buildings at the resort, including the cottages, are connected to a sewerage system with an outlet into Sandusky Bay, at the southerly end of the point. As the bay receives all the sewage from the city of Sandusky the amount added by Cedar Point is not appreciable.

All the toilets inspected were reasonably clean and showed evidence of careful supervision. Fixtures are not in the best condition and in some instances should be replaced.

Garbage. Garbage is systematically collected and disposed of. There was no evidence of garbage or other refuse matter about the grounds.

Bathing. The bathing beach is considered to be one of the best and is extensively used. There was no evidence of sewage, garbage or other polluting material on or near the beach.

CATAWBA ISLAND.

This resort is located at the northern point of Catawba Island Township in Ottawa County, nine miles from Port Clinton. There are three small hotels or boarding houses and several groups of cottages. The resort has been used for many years and many of the buildings are old. There is a permanent settlement and the number of visitors does not exceed a few hundred at one time.

Water Supply and Sewers. There is no public water supply nor sewers. The hotels and cottages use water from wells or cisterns for all purposes.

Privies. Cesspools and privies are in common use. These are nearly all old and no especial care was taken in their construction.

Bathing. There is a so-called bathing beach at the easterly end of the point, but this is little patronized owing to the rocky nature of the shore.

REPORT
OF
DIVISION OF COMMUNICABLE
DISEASES

(671)



REPORT OF THE DIVISION OF COMMUNICABLE DISEASES.

The division of communicable diseases as now constituted consists of an epidemiologist and a clerk. The duties of the epidemiologist are to investigate the causes of the prevalence of the various contagious and infectious diseases which are reportable in the State; to make or confirm diagnoses where a contagious or infectious disease is suspected but there exists a difference of opinion among attending physicians; to advise with local health authorities concerning the restriction and prevention of communicable diseases, and to assist in the hygienic laboratories. Other functions of the division consist in the collection and classification of statistics concerning epidemic diseases, and in the preparation of popular and scientific articles and pamphlets for distribution among the public and to local health authorities.

Investigations of the causes of epidemic diseases fall into two classes; laboratory work dealing with the causative factors and other features of disease with which we are not yet familiar, and may be classed as research work; and field investigations pertaining to the factors having to do with the transmission and sources of communicable diseases. Research work in the study of infantile paralysis has been undertaken under the direction of the Secretary. With this work field investigations were made and considerable statistical data was collected dealing with the clinical and epidemiological features of this disease. The results of this research work will be published separately.

Field investigations have been of a routine nature and comprise the study of the sources of typhoid fever in epidemic and endemic form, of scarlet fever, smallpox, diphtheria and epidemic cerebro-spinal meningitis.

Health departments of cities, incorporated villages and townships are required to report the presence or absence of acute poliomyelitis, Asiatic cholera, bubonic plague, cerebro-spinal meningitis, chickenpox, diphtheria, measles, membranous croup, scarlet fever, smallpox, trachoma, tuberculosis, typhoid fever, and whooping cough; and the semi-monthly cards which they submit are filed; any special prevalence of a communicable disease noted, and correspondence or field work undertaken according to the nature of the report.

Pamphlets and other publications are being prepared and brought up to date as rapidly as possible. The pamphlets on scarlet fever and diphtheria have been revised and information concerning infantile paralysis, epidemic cerebro-spinal meningitis and other communicable diseases has been distributed through the medium of the MONTHLY BULLETIN. In addition, papers were read at two conferences of the Ohio State Board of Health with local health officers and at three county medical societies.

On September 11th, the epidemiologist visited Zanesville at the request of a member of the Board, to meet the members of the Muskingum County Medical Society, who had set apart the evening of September 11th for the discussion of acute poliomyelitis.

A special delegation of physicians from Roseville met with the other members of the Muskingum County Medical Society. They were addressed by a member of the State Board of Health, and were instructed in the measures of prevention recommended by the State Board of Health. A number of cases of a suspicious nature were reported by the members of the society; such a number, in fact, as would lead to the belief that reports of acute poliomyelitis from Muskingum County do not bear out the facts.

No pamphlets have as yet been issued on acute poliomyelitis, epidemic cerebro-spinal meningitis, measles or whooping cough.

Owing to the close relationship existing between the hygienic laboratories and this division, the office of the epidemiologist is located in the laboratory office.

It is planned to bring this division more closely in touch with local health departments by increasing the efficiency of semi-monthly reports and including them in the BULLETIN. By this means the division will be enabled to undertake investigations and apply preventive measures before disease has been allowed to spread, or the cause of an epidemic has ceased to operate. This in itself will well repay any additional labor incident to the collection of statistics.

Experimental work in the field and laboratory will be continued and further work undertaken as problems present themselves.

The report proper covers all investigations made with the exceptions mentioned above and the reports of each submitted to the Secretary follow.

[Signed]

FRANK G. BOUDREAU, M. D.

Epidemiologist,

Division of Communicable Diseases.

To the Secretary of the Ohio State Board of Health,
Columbus, Ohio.

ACUTE POLIOMYELITIS.

Acute poliomyelitis was more prevalent in Ohio during 1912 than ever before, and in Dayton, Barberton, Roseville, and Cleveland the disease reached epidemic proportions. In the early summer of 1911 a considerable outbreak of the disease was reported in Covington, Kentucky, and from there it spread to Cincinnati. Cleveland also reported fifty-five cases during that period. For a number of years previous to this sporadic cases were known to occur in many parts of Ohio and the results are visible in many crippled children, whose deformities have remained and will in many instances remain for life. In 1912 however, outbreaks in the

cities mentioned above did not equal the number of cases reported in the rural districts, and the distribution was wider as the number of cases was greater than ever before. Prompt measures were taken to restrict the spread of this dread disease. Rules and regulations in accord with those suggested by authorities elsewhere and with the best practice, were adopted and distributed, and correspondence and field work were undertaken. It is well within the bounds of reason to suppose that these steps resulted in a marked restriction of the disease and in a shortening of epidemic periods. A copy of the regulations adopted follows:

RULES RECOMMENDED FOR THE CONTROL OF ACUTE POLIOMYELITIS.

1. Isolation of the patient and screening to keep out insects. Domestic animals should be excluded from the room.

2. Disinfection or destruction of all discharges, especially the sputum and nasal secretions and excretions from the intestines. Nurse and physician should observe the same precautions regarding their hands and clothing as in attending a case of scarlet fever.

3. A modified quarantine should be observed. Other children in the family should certainly be excluded from school. The bread-winner may be allowed to work. Three weeks should be the *minimum* period of isolation and quarantine.

4. When this disease is present in a community, public gatherings which children will attend should be discouraged.

5. Members of the family and those exposed should use a gargle and spray consisting of 1% of hydrogen peroxide.

6. As soon as practicable after recovery of the patient, the house should be disinfected with formaldehyde.

7. The attention of physicians should be directed to the fact that abortive cases are often associated with typical cases, and the same precautions should be observed with such cases.

8. Acute poliomyelitis (infantile paralysis) has been declared by the State Board of Health to be a reportable disease. This means that all cases must be reported by physicians to the health officer and by the health officer to the Secretary of the State Board of Health.

9. Since the disease is infectious prior to the onset of paralysis, suspected cases should be reported and quarantined until the exact nature of the disease is known.

NOTE—When a case of acute poliomyelitis is reported to the State Board of Health, a special blank for detailed information will be sent the physician or health officer and it is requested that these blanks be carefully filled out and promptly returned.

On September 24th, upon request of the health officer, the epidemiologist visited Spring Valley to make a post-mortem examination of a patient who died with symptoms resembling epidemic meningitis. The corpse was a boy, nine years of age, who had taken sick suddenly on the 6th. He developed cerebral symptoms on the 7th, and died on the morning of the 8th, after a period of low, muttering delirium.

The examination revealed the presence of typical lesions of acute poliomyelitis. The health officer was instructed to keep the remaining

children and other exposures away from school, and to carry out the measures recommended by the Board for the prevention of poliomyelitis.

No other cases developed. The diagnosis of acute poliomyelitis was confirmed in the laboratory by microscopical and inoculation tests.

The report of the distribution and number of cases in the state appears elsewhere.

CEREBRO-SPINAL MENINGITIS.

Epidemic cerebro-spinal meningitis was more prevalent than usual in 1912, and in some localities this disease and infantile paralysis appeared simultaneously, rendering the diagnosis difficult in many instances. It is also probable that many cases reported as epidemic meningitis were in reality infantile paralysis and the reverse is probably true also.

The fact that many physicians, out of their limited experience, declared that these diseases were not contagious, was one of the greatest hindrances in their restriction, for health officers, not well versed in medicine, hesitated to differ with attending physicians and quarantine. Aside from the fact that the law is on the side of the health officer in enforcing quarantine in these diseases, it is evident to any one whose experience is at all large that these diseases are communicable diseases in the true sense, and authorities are in accord on this point. If physicians would co-operate intelligently in public health work, enormous advances would be made.

CHICKENPOX.

Chickenpox is not of itself a serious problem, occurring rarely in epidemic form and causing few deaths. It is very liable to be mistaken for smallpox and *vice versa*. Mistakes of this nature have occurred in Ohio in 1912 on numerous occasions.

MEASLES.

Measles was extremely prevalent in 1912 and caused its usual quota of deaths. While it is a very difficult disease to control, some effort should be made to keep its spread within bounds. School houses are usually the source of the cases, for children in the early acute stage here communicate the disease to others. The sequelae which comprise tuberculosis and others less malignant should cause the disease to be regarded in a more serious light than is usual. Pamphlets for parents and health officers will be prepared and distributed shortly.

DIPHTHERIA.

Few investigations for the restriction of diphtheria were made in 1912. The prevention of membranous croup and diphtheria rests largely with the laboratory for the microscopical has to a large extent supplanted the clinical diagnosis. The report of the Hygienic Laboratories shows a large increase in the number of specimens examined for diphtheria

over 1911. Many of these were release examinations. Carriers were also detected through examinations in the laboratories. The only intelligent method of concluding quarantine in diphtheria is by the use of cultures, two of which, taken on separate occasions at least two days apart should be negative before the patient is released. This rule has been recommended and has been successful in a number of instances.

SCARLET FEVER.

The cases and deaths attributed to scarlet fever during 1912 were numerous, and when it is considered that although the disease is not strictly preventable and yet can be restricted to a considerable extent, it is seen that the figures represent a useless waste of life and money, both to the individual and to the community.

Epidemics of scarlet fever are often due to the confusion existing in many physicians' minds as to the unity of scarlatina, rose rash, scarlet rash and scarlet fever. Where the idea arose that these diseases are not one and the same is not known, but no standard book on the practice of medicine carries such a statement. In addition many physicians regard mild cases of scarlet fever as not dangerous, whereas we have no evidence to lead us to believe that mild cases are not equally as dangerous as the most malignant form. Another factor entering into the continued spread of this disease is that when desquamation is complete all cases are discharged, whereas there may exist a dangerous discharge from the ear or nose of the patient. Modern thought on this subject has changed from the conception of the desquamated skin as the carrier of the contagium to that of the naso-pharyngeal and aural discharges. It is still wise to confine the patient until desquamation has ceased, but more attention should be paid to the discharges mentioned above. Under the present laws regarding scarlet fever, the length of quarantine is left to the discretion of the physician in attendance, the section only stipulating that after convalescence and disinfection the remaining members of the family shall be confined for a period of ten days, to allow for the incubation period of possible new cases. In the past many cases have been declared convalescent by physicians in two or three weeks after the onset of symptoms, and the result has been that many patients still capable of transmitting the disease are released and spread the disease at school and among their playmates. It would appear wiser to insist upon some arbitrary period of quarantine, six weeks for instance, and require that this be the minimum time and that any desquamation, or more particularly any discharge from or unhealthy condition of, the naso-pharyngeal or aural mucous membranes should continue the period of quarantine until such discharge or unhealthy conditions cease. Under the present conditions the school house is the medium in which the various factors that lead to the dissemination of scarlet fever are focused. So long as the present quarantine laws are

in force these conditions will persist, and to restrict and modify their force calls for some such stringent rule as was adopted at Reading and which appears in this report under the proper heading. The recommendations made at Reading are applicable in all other parts of the state and if adopted would lead to a marked diminution in the prevalence of scarlet fever.

TYPHOID FEVER.

Under the provisions of the Bense Act, a marked diminution in the pollution of streams and therefore in the morbidity and mortality from typhoid fever is to be looked for. Attention which was formerly directed to water supplies as a source of infection will now be turned to such other sources as milk, raw food, contact, flies or other less important factors. After water, the most important source of typhoid fever is milk. Explosive epidemics and small outbreaks arising rapidly on the route of one distributor are characteristic of milk-borne infections. To prevent the infection of milk is a task the ramifications of which extend to every corner of the state, and the enormity of which can hardly be realized. In proportion to the size of the problem are the beneficial results when once attained. In Ohio this is well shown in Cincinnati and Cleveland where the system of milk inspection is worthy of the highest praise. Not only does efficient milk inspection lead to a reduction in the number of milk-borne outbreaks of typhoid fever but the incidence of scarlet fever can be abated, and, most important of all, the excessively high infantile mortality common to cities whose system of inspection is inefficient, can be greatly reduced. Contact or personal infection requires personal instruction and a campaign of education through newspapers, pamphlets and other like measures. Were Part IV. of the Building Code made applicable to private as well as public buildings, so that privies and cess-pools could be regulated, the amount of typhoid fever in the country districts would be materially reduced. Efficient garbage collection is also needed in many cities and villages, and this would lead to a diminution in the number of cases of typhoid fever due to fly infection. Cities and villages of Ohio have maintained expensive campaigns for the purpose of exterminating the house fly, and the methods in many instances have been ill advised and futile. Fly-swatting campaigns are useful only in the spring and early part of the summer, when the death of one fly means thousands less in the course of the summer. Campaign at this time for exterminating flies, then see that no breeding-place is left for them and the difficulties of fly extermination will cease.

In 1912 Ohio did not suffer in greater degree than usual from typhoid fever. The rural districts showed an unduly high morbidity and mortality from typhoid fever but the rate in some of the larger cities, such as Cleveland and Cincinnati, was remarkably low.

WHOOPING COUGH.

Whooping cough is not usually looked upon as an important problem for public health officers, but a glance at the mortality tables will reveal the fact that it is at least as important as scarlet fever. Usually nothing is done for its restriction, but the gravity of its complications calls for strict measures. A pamphlet on the subject will be issued by this division and information printed from time to time in the MONTHLY BULLETIN. Health officers too must be urged to enforce more vigorously the measures of prevention against whooping cough.

TABLE OF COMMUNICABLE DISEASES REPORTED TO THE STATE BOARD OF HEALTH DURING 1912.

	Chicken Pox.		Diphtheria.		Measles.		Scarlet Fever.		Small Pox.		Whooping Cough.		Typhoid Fever.		Acute Poliomyelitis.		Cerebro Spinal Meningitis.		Trachoma.	
	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D
ADAMS COUNTY.																				
Rome																				
West Union																				
Green			20	0			16						3							
Jefferson			10	1																
Jefferson Twp.			22	2																
McClure			79	3	7		2						5							
McClure Twp.			11	1	1		1													
Monroe			5																	
Monroe Twp.			2	1																
Oliver			3	1	1		1						1							
Scott			2				1													
Spring			12				1						1							
Thinn																				
Total			164	9	9		22						9							
ALLEN COUNTY.																				
Lima	10		52	4	53		29	1	1		1		2	6						
Beaver Dam	6				159								23	3						
Elida					24						57									
Spencerville													2		1					
Bath					2		1													
German					1		1													
Marion					43															
Monroe							1													
Perry			1																	
Richland			1				1													
Spencer			1				2													
Sugar Creek			1																	
Total	25		55	4	282		35	1	1		58		27	9	1					

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Crestline	Vil.	1	1	2	6	2	1	248	49	110	21	32	28	21
New Washington	..	1	1	1	..	..	..	..	..	..	..	..	..	..
North Robinson	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Auburn	Twp.	1	..	..	..	..	..	..	..	..	..	..	..	..
Bucyrus	..	1	..	..	..	..	..	..	..	..	..	..	..	..
Chatfield	Twp.	1	9	1	..	..	..	..	..	..	..	..	..	..
Granberry	Twp.	..	..	..	..	..	..	..	..	..	..	..	..	..
Jefferson	Twp.	1	..	..	..	..	..	..	..	..	..	..	..	..
Lykens	Twp.	..	..	7	..	..	..	..	..	..	..	..	..	..
Sandusky	Twp.	..	..	3	..	..	..	..	..	..	..	..	..	..
Whetstone	Twp.	..	..	1	..	..	..	..	..	..	..	..	..	..
Total	..	11	40	34	2	6	2	22	..	..	..	..	..	..
CUYAHOGA COUNTY.														
Cleveland	..	2,612	114	1,998	95	9	1	618	30	248	49	110	21	32
Newburgh	..	36	2	34	1	2	..	12	..	..	..	..	..	..
Bagley	Vil.	2	3	2	..	3	..	..	..	..	..	..	..	..
Pedford	Vil.	..	..	..	..	..	..	..	..	..	..	..	..	..
Percia	Vil.	8	..	20	..	..	..	..	..	11	..	..	..	..
Bratenahl	Vil.	..	..	1	..	..	..	..	..	..	..	..	..	..
Chagrin Falls	Vil.	14	2	7	..	..	..	..	..	2	..	..	..	..
Cleveland Hts.	Vil.	..	..	3	..	..	..	1	..	1	1	..	..	..
Dover	Vil.	4	..	..	..	..	..	..	..	..	..	..	..	..
Euclid	Vil.	8	1	..	..	..	..	1	..	..	..	..	..	..
Lakewood	Vil.	4	4	4	..	8	..	..	..	2	1	..	..	..
Newburg Hts.	Vil.	1	1	3	2	..	..	2	..	..	..	..	..	..
Nottingham	Vil.	20 ^a	1	..	..	..	..	..	..	..	..	..	..	..
Dimastad Falls	Vil.	..	..	4	..	..	..	..	..	..	..	..	..	..
Rocky River	Vil.	10	2	12	..	4	..	2	..	1	..	..	..	..
East View	Vil.	2	..	1	..	..	..	..	..	..	..	..	..	..
West Dover	Vil.	2	2	19	1	4	..	..	..	..	..	..	..	..
Pedford	Vil.	1	..	3	..	..	..	..	..	..	..	..	..	..
Brecksville	Twp.	..	..	..	..	..	..	..	..	..	..	..	..	..
Mayfield	Twp.	..	1	..	..	..	..	..	..	..	..	..	..	..
Middleburgh	Twp.	24	..	5	..	..	..	2	..	2	..	..	..	..
Orange	Twp.	..	..	2	..	..	..	..	..	..	..	..	..	..
Kowalton	Twp.	..	..	..	..	..	..	..	..	4	..	..	..	..
Solon	Twp.	3	1	..	..	..	..	..	..	..	..	..	..	..
Strongsville	Twp.	..	..	2	..	2	..	..	..	..	..	..	..	..
Warrensville	Twp.	2	..	..	..	..	..	..	..	..	..	..	..	..
Total	..	2,759	152	2,391	98	28	1	636	30	273	50	111	22	34
DARKE COUNTY.														
Greenville	Vil.	3	1	..	..	..	..	..	..	4	..	5	1	..
Arcanum	Vil.	..	..	..	..	..	..	..	..	1	..	1	..	..
Castine	Vil.	..	..	..	..	..	..	..	..	1	..	..	..	..
Gordon	Vil.	1	..	..	..	..	..	9	..	..	..	..	..	..
Hollansburg	Vil.	..	..	..	..	..	..	..	..	..	..	..	..	..
New Madison	Vil.	..	..	2	..	..	..	..	..	1	..	..	..	..
New Weston	Vil.	..	..	5	..	..	..	..	..	1	..	..	..	..

TABLE OF COMMUNICABLE DISEASES — Continued.

	Chicken Pox.		Diphtheria.		Measles.		Scarlet Fever.		Small Pox.		Whooping Cough.		Typhoid Fever.		Acute Poliomyelitis.		Cerebro Spinal Men- ingitis.		Trachoma.
	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	
DARKE COUNTY—Concluded.																			
Palestine																			
Pittsburg					29							1							
Rosburg																			
Union City	1		2		6		4				13		2						
Versailles	1																		
Adams																			
Allen					4								3						
Butler																			
German													1						
Greenville													1						
Monroe			2		25														
Neave																			
Patterson													1						
Twin																			
Van Buren			1																
York					1														
Total	3		8	1	72		6				25		17		13	2			
DEFIANCE COUNTY.																			
Defiance	9		21	2	9		1		3		5				2	1			
Hicksville																			
Sherwood					2		7	1					9						
Defiance	1								1		3								
Delaware																			
Farmers			1																
Highland			5				1		4				3						
Mark					5						2		1						

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TABLE OF COMMUNICABLE DISEASES — Continued.

	Chicken Pox.		Diphtheria.		Measles.		Scarlet Fever.		Small Pox.		Whooping Cough.		Typhoid Fever.		Acute Poliomyelitis.		Cerebro Spinal Meningitis.		Trachoma.	
	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D
GREENE COUNTY—Concluded.																				
Ross																				
Silver Creek.....Twp.							2													
Sugar Creek.....Twp.					3		3													
Total	12		12		73		11		3		37		9		5	2				
GUERNSEY COUNTY.																				
Cambridge																				
Byesville			7		38		11		3											
Lore City.....Vil.			14										22	1	4	2	1			
Quaker City.....Vil.	2				20		1		1				7							
Senecaville			1																	
Adams					3						8					2				
Cambridge	3												1							
Jackson							4													
Landon			5																	
Londonderry			2		1															
Millwood			1											1						
Richland					5															
Valley			2	1											1					
Total	5		32	1	67		16		4		3		30	1	6	4	1			
HAMILTON COUNTY.																				
Cincinnati	653	2	1,155	63	2,374	22	971	34	35		331	21	190	21	9	5	79	50		
Norwood	47		25	2	35		25		2		14		11	2			2			
Addison	1		4				5											1		
Arlington Heights.....Vil.																				
Cheviot	7		2		10		3		1											
Cleves					1								4							

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HANCOCK COUNTY.

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HARDIN COUNTY.

Kenton	1			4	2
Ada	VII.		4	4	
Alger	VII.	29	4	4	9
Dunkirk	VII.	1			
Forest	VII.	2		2	1
	VII.	8	1		

TABLE OF COMMUNICABLE DISEASES — Continued.

	Chicken Pox.		Diphtheria.		Measles.		Scarlet Fever.		Small Pox.		Whooping Cough.		Typhoid Fever.		Acute Poliomyelitis.		Cerebro Spinal Meningitis.		Trachoma.	
	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D
HARDIN COUNTY — Concluded.																				
McGuirey																				
Buck			3	1	6		1						2							
Cassina			5				2						1							
Liberty			3	2									3	1						
Lynn			2										1							
McDonald			2				2						2							
Marion			2										1							
Pleasant													1							
Total			24	3	33	1	5		4		15		20	2	1					
HARRISON COUNTY.																				
Bowersdown																				
Cadiz			1	1	4		3				2		3							
Freeport													3							
Jewett											6									
Cadiz													1							
Freeport			2				3													
German			1								25		1							
Green													2							
Monroe					12						18		1							
Nottingham											6		1							
Short Creek			2	1	2		1				10		3							
Stock																				
Total			7	2	18		7				67		14		2					

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TABLE OF COMMUNICABLE DISEASES — Continued.

	Chicken Pox.		Diphtheria.		Measles.		Scarlet Fever.		Small Pox.		Whooping Cough.		Typhoid Fever.		Acute Poliomyelitis.		Cerebro Spinal Meningitis.		Trachoma.	
	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D
LUCAS COUNTY.																				
Toledo	306	...	393	57	1,629	23	339	16	87	1	259	22	156	49	1	1	...	...	...	...
Waterville	...	...	...	...	4	...	...	...	...	...	40	...	2	...	...	...	...	...	...	...
Whitehouse	32	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Jerusalem	...	...	...	...	1	...	8	...	85	...	...	...	...	...	...	...	...	...	...	...
Oregon	...	...	1	...	...	...	6	...	1	...	...	...	...	...	...	...	...	...	...	...
Providence	...	...	...	...	4	...	2	...	...	...	7	...	...	...	...	...	...	...	...	...
Richfield	1	...	1	...	...	...	11	...	...	...	...	...	...	...	...	...	...	...	...	...
Swanton	...	...	...	...	...	...	6	...	1	...	...	...	3	...	...	...	...	...	...	...
Washington	...	...	9	...	8	...	...	...	8	...	...	...	...	...	...	...	...	...	...	...
Total	339	...	404	57	1,546	23	372	16	182	1	306	22	161	49	1	1	...	...	...	...
MADISON COUNTY.																				
London	1	...	1	...	...	...	1	...	3	...	...	...	8	...	...	...	2	1	...	...
South Solon	...	...	2	...	...	...	...	...	...	...	...	...	1	...	...	...	1	...	...	...
West Jefferson	...	...	3	...	...	...	13	...	1	...	...	...	...	...	...	...	...	...	...	...
Canaan	...	...	...	...	...	...	4	...	...	...	...	...	...	...	...	...	...	...	...	...
Darby	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Deer Creek	...	...	...	...	...	...	1	...	5	...	...	...	...	...	...	...	...	...	...	...
Fairfield	...	...	...	...	1	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...
Jefferson	...	...	...	...	...	...	...	...	4	...	...	...	...	...	...	...	...	...	...	...
Monroe	...	...	4	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Paint	...	...	...	...	5	...	2	...	...	...	...	...	...	...	...	...	...	...	...	...
Somerford	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Total	2	...	10	3	6	...	20	...	14	...	...	...	9	...	...	3	1	...	...	...
MAHONING COUNTY.																				
Youngstown	...	...	253	20	28	4	64	9	...	...	4	1	56	7	2	...	...	...	...	...
East Youngstown	...	...	48	1	2	...	33	10	...	...	...	...	2	...	1	...	...	...	...	...

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TABLE OF COMMUNICABLE DISEASES — Continued.

	Chicken Pox.		Diphtheria.		Measles.		Scarlet Fever.		Small Pox.		Whooping Cough.		Typhoid Fever.		Acute Poliomyelitis.		Cerebro Spinal Meningitis.		Trachoma.	
	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D
PREBLE COUNTY — Concluded.																				
Jefferson																				
Lanier			1				60													
Lanier Twp.			1				1													
Somers			1																	
Washington	2																			
Total	22		6	1	11		76		1		5		16	3	1		2			
PUTNAM COUNTY.																				
Columbus Grove																				
Continental							1	1												
Cloverdale																				
Dupont													4	1						
Pt. Jennings					25								1							
Kalida	10																			
Levasic			3										2							
Levasic Twp.																				
Miller City													1							
Ottoville	22																			
Greensburg							1													
Jennings					70															
Liberty													1							
Montgomery	11						3													
Palmer			1																	
Pleasant			1																	
Pleasant Twp.					16															
Sugar Creek			3		4								2							
Union	4																			
Total	47		8		115		5	1			3		15	1	2					

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TABLE OF COMMUNICABLE DISEASES — Continued.

	Chicken Pox.		Diphtheria.		Measles.		Scarlet Fever.		Small Pox.		Whooping Cough.		Typhoid Fever.		Acute Poliomyelitis.		Cerebro Spinal Meningitis.		Trachoma.	
	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D
SUMMIT COUNTY — Continued.																				
Hudson			1				5				4		4							
Kenmore			6				5		25				1			3				
Macdonia					1		9						2							
Magadore			4		15		3				11									
Peninsula					9		1						2							
Boston Twp.																				
Copley Twp.			1								22									
Franklin Twp.			7		6															
Green Twp.			4	1									4	2						
Hudson Twp.					12								2							
Northampton			3	1			1													
Northfield					15								1							
Norton Twp.															1					
Richfield			1				1													
Springfield			2				1													
Stowe Twp.			2				8													
Tallmadge			1	1			1													
Twinsburg	5										6				1					
Total	21		323	22	85		177	22	25		50	1	46	10	26	2	3			
TRUMBULL COUNTY.																				
Warren			4	2			3													
Cortland					28								18							
Girard	3		18	1	16		2				4		10							
Hubbard			1	1									8							
Mineral Ridge			3				1													
Orangeville					11															
Warrenville													9							
Braceville Twp.	1										2		1							

[illegible]

SPECIAL REPORTS.

INFANTILE PARALYSIS AT BARBERTON.

On July 14th, 1912, the health officer at Barberton reported seven cases of infantile paralysis, and requested information dealing with its prevention. Since acute anterior poliomyelitis is a disease which requires careful study and which the State Board of Health has decided to investigate wherever possible, a personal investigation was made, the preliminary report of which follows:

Before entering into detail concerning the situation at Barberton it might be well to outline the methods used in the investigation of infantile paralysis with such facts concerning the disease as bear on its epidemiology.

Acute anterior poliomyelitis is a disease occurring chiefly in children under the age of five, but sparing no age or sex. Of adults, males are especially susceptible. The disease is regarded by authorities as transmissible by direct contact. The factor of individual susceptibility, however, must be taken into account, as many who are directly and frequently exposed do not contract it. The fact that experiment and clinical study have proven it to be preventable to some extent is worthy of our attention. Facts dealing with this phase of the subject are numerous. The virus has been shown to be present in the nasal and buccal secretions and in the blood. It has been successfully inoculated through the respiratory and digestive tracts.

At present it is most important to gather data concerning the symptoms of onset and the clinical picture in abortive types of the disease. The question of contagion is very important and must be thoroughly investigated. In some epidemics the transmission of the disease by direct contact seems very probable, but in others it is remote. Food and water supplies have been practically eliminated as probable sources of general infection. Nor do unfavorable hygienic conditions seem to exercise any influence upon the spread of the disease, although this has not been definitely established. The question of insect transmission is one to which much attention has been directed, with the result that authorities are generally agreed that such a method of transmission is improbable. In the vicinity of the cases it has been noticed that there were present various diseases of animals, including paralysis, and it is possible that the lower animals may act as a host for the virus in some part of its cycle. Dust has been suggested by some authorities as a possible source since epidemics follow periods of hot dusty weather, and children at the crawling and creeping age are most liable to be affected. Many of the accumulated facts concerning infantile paralysis are contradictory and further collec-

tion of data is necessary. For this purpose a blank form was adopted by the conference of State and Territorial Health Officers with the Public Health and Marine Hospital Service. This form was used in this investigation. Copies may be secured by addressing the Secretary of the State Board of Health, Columbus, Ohio.

DETAILS OF THE OUTBREAK AT BARBERTON.

Barberton is a city with a population of 9,410. It is situated in Summit County, ten miles southwest of Akron to which it is connected by railway and traction lines. There are quite a number of manufacturing plants in and around Barberton representing many branches of industry, the largest being concerned with the manufacturing of tile pipe and allied products.

To facilitate the investigation, the following letter was addressed to all physicians at Barberton:

"The fact that infantile paralysis has been prevalent in Barberton has led to an investigation by the State Board of Health. Such an investigation can only be of value when it is given the active support of physicians attending cases. Your co-operation is therefore earnestly requested.

"In 1910, infantile paralysis was made reportable by the State Board of Health. Reports to be of value should be made early, if possible during the acute stages of the disease. Authorities everywhere agree that in the presence of an epidemic there are always a number of abortive cases, patients who have all the symptoms of onset, but in whom paralysis does not appear. Such cases are especially valuable for investigating purposes, as it is possible that they are responsible, in part, for the spread of the disease. You are therefore requested to report such cases to your health officer on suspicion even before you have made a diagnosis.

"Various measures have been recommended for restricting the spread of infantile paralysis. Children so afflicted should be isolated, and the family quarantined for a period of three weeks, dating from the onset of acute symptoms. The bread-winners of the family, however, should be allowed to work, but warned to keep away from children. The patient's discharges, particularly those of the mouth and nose, should be destroyed. Urotropin has been recommended as a prophylactic. It does not appear to be of value after the paralysis has set in, but may be useful at the beginning of the acute stage and in children who have been exposed.

"I trust you will co-operate with your health officer, so that measures for the restriction of this terrible disease may be properly enforced."

DATA COLLECTED.

The date of onset of the first case of infantile paralysis as far as could be determined was the 16th of May. Since that time cases have developed as follows:

One each on June 15th, 22nd, 24th, 26th, 27th, 28th, 30th, two on June 29th, one each on July 1st, 7th and 8th.

In addition to these a case was reported on July 18th, the onset of whose illness, however, took place on July 15th. In all 14 cases have been reported, 13 of whom form the basis of this report. Of the 13 cases, one did not develop paralysis and is included as a possible abortive case. There were six males and seven females.

AGE:—

The youngest was 14 months and the oldest 17 years,—11, or 84.5%, were under five years.

NATIONALITY:—

The nationality of the parents was as follows: German 7; English 3; Polish 1; Hungarian 1; and Welsh 1.

OCCUPATION OF PARENTS:—

Four were factory employes; one was a carpenter; one a butcher; one a clerk; one a paper-hanger; one a farmer; one a store-keeper. In only one case did the mother have any other occupation than that of a housewife, the exception being a factory employe. As may be seen by the date of onset the disease had passed beyond the acute stage in all cases before this investigation was made, so that the history had to be relied upon for data concerning the initial symptoms. This constitutes one of the difficulties in the study of infantile paralysis as the diagnosis, even a tentative diagnosis, is seldom made before the onset of paralysis. It is necessary to gather information concerning the initial symptoms, for any treatment to be of value must be exhibited prior to the onset of paralysis, before the damage is irreparable.

ACUTE SYMPTOMS:—

The temperature varied,—four reaching as high as 104°F. The average degree of temperature recorded was 101°—102°F. and as it was taken not more than once a day for two or three days and no record kept, the temperature curve could not be ascertained. In no case was the presence of fever denied, although several cases had not been seen by physicians during the acute stage and the symptoms must have been hardly noticeable. Headache was noted in three cases, in two occipital, in one frontal. Other patients were too young to complain. Disturbance of the bowels was noted in seven cases. Constipation was present at the outset in three cases and diarrhoea in three. There was vomiting in one case. In one case there was diarrhoea at the outset followed by constipation later on. Sore throat, (objectively) was present in five cases, accom-

panied in one instance by glandular swelling. In four cases it was denied. A history of pain was elicited in four cases, in one situated in the back of the neck and one in the lower limbs. The hand was affected in another, and in a fourth it was located over the lumbar vertebra. Many of the patients were of course, too young to be able to give a history of pain or its location, but they were intolerant of handling and fretful. Tenderness was noted in five. There was some difficulty in determining where it was located, but it was probably in the back since the patient feared any movement. The location, however, as given in the history was as follows: In one it was almost general, being especially marked in the lower limbs. In another tenderness was noted over the vertebra. Retraction of the head was present in eight cases,—it was slight in seven and very marked in one. Restlessness was present in four cases, drowsiness in three, in four cases restlessness and drowsiness alternated.

DISTRIBUTION OF PARALYSIS AT ITS WORST:—

In two cases paralysis affected all four limbs,—in one the right side of the face, left arm and leg were affected. In three cases the arm and leg were paralyzed,—in two paralysis affected the arm on one side and the leg on the opposite side,—in one case both lower limbs were paralyzed,—three cases suffered in one limb only,—in two no accurate observations had been made, but it was noticed that they were unable to walk. They had been perfectly healthy prior to their illness, being able to walk and run.

RECOVERY AND IMPROVEMENT:—

The amount of improvement was difficult to estimate since accurate observation of the paralysis at its worst had not been made. In seven cases improvement was slight,—in three there was almost complete recovery,—in two there was no improvement noted,—one was a disputed abortive case in which no paralysis had taken place.

REFLEXES:—

Examination of reflexes was made at the time of the investigation. The pupils in all cases were equal and active, reacting normally to light and accommodations. The sense of pain was normal and the tactile sense not diminished in any case. In all cases but one the patellar reflexes were absent in the paralyzed limb. There were no areas of paresthesia or anaesthesas discovered. In one case the reflexes were increased and the paralysis involved the muscles of the face.

ATROPHY:—

In one case the atrophy was very marked affecting the buttock on the paralyzed side,—in other cases it was slight or absent, depending upon the amount of paralysis.

STATUS OF FAMILY:—

The families were well to do in two instances, 13 were in moderate circumstances,—one family was poor.

GENERAL SANITARY CONDITIONS:—

The sanitary conditions were good in one case, fair in eight cases and bad in four.

PREVIOUS GENERAL HEALTH OF PATIENTS:—

Previous general health of the patients had been excellent in two cases, in ten good, and in one poor.

ACCIDENT OR ILLNESS ONE MONTH PRIOR TO ATTACK:—

In only one case had there been an accident previous to the attack. In this instance the patient had fallen part of the way down stairs two weeks previous to her illness, but no bad effects were noticed.

SEWAGE DISPOSAL:—

Four of the families had flush-closets,—seven depended upon outside privies.

AVERAGE NUMBER OF OTHER MEMBERS OF FAMILIES IN HOUSE:—

Children: Males .72, females 1.27.

Adults: Males 1.72, females 1.26.

These figures include guests, boarders and servants. In no case had there been other sickness in the families one month prior to attack or since to date.

TREATMENT:—

The treatment employed during the acute stages was symptomatic. The bowels were cleared. Aconite and gelsemium were exhibited in several cases. Two patients were given small doses of urotropin, and the physician stated that in his opinion this drug had modified paralysis. When acute symptoms had subsided, massage and passive movement were largely employed.

ANIMALS ON THE PREMISES:

In seven of the families fowls were kept on the premises. In two cases cows and horses were kept, in addition to fowls. No disease had been noticed. In one instance a horse kept by a family had sickened a few days previous to the onset of symptoms in the patient. There was no paralysis, however, merely temporary bowel trouble.

CONTACT:—

In two instances there were two cases in a family. In one family the illness and paralysis following it occurred on the same dates. In the

other family one of the cases was of a disputed abortive type. The illness of this patient occurred two days after the former. Three cases lived on the same street and were close neighbors,—two other cases lived on one street only a short distance apart. A further report will show graphically the relationship of the cases. It might be noted here, however, that a majority of them were confined to one part of the city and there was ample opportunity for direct and indirect contact. This history however, was lacking in nearly every case.

ABORTIVE CASES:—

The history of the abortive case follows:

T. L., aged 4, male. This patient was taken sick on June 30th, two days after the onset of his sister's illness. His complaints were naturally not specific, but he vomited several times, had severe frontal headache and some sore throat. The physician attending his sister took his temperature and found it to be 102°F. He was restless at times but would lie in a drowsy and apathetic condition for considerable periods. When lifted he would cry out, and his lower limbs seemed to be especially tender. His appetite was poor and he did not care to play with the other children as before. This continued up to July 4th. On this date he did not arise from his bed and when raised he had no desire to walk. It is difficult to determine at this stage whether he could not walk or was only in a weakened condition. On the occasion of the physician's next visit the boy was running about out-doors so that no further attention was paid to his illness. The physician stated that he had given him quinine sulphate as he thought he had malaria, although a definite history of chill was absent. On examination on July 16th, the patient was found to be a healthy boy of stated age. His skin was warm and moist, movements active, no tenderness or pain. When he walked about there appeared to be a slight dragging of the toes of the right foot. The patellar reflex on that side seemed to be slightly weaker than on the left; other reflexes were normal.

WEATHER:—

The outbreak was preceded by a period of hot, dry weather. Further meteorological data will appear in a subsequent report.

CONCLUSIONS.

It is difficult to draw any accurate conclusions from the data here recorded. The disease appeared to be mild, there being no deaths and the acute symptoms hardly noticeable in the majority of cases. The fact that the first case appeared on May 16th, was followed by a second on June 15th, and that from this date to July 8th a majority of the cases occurred, leads to the suspicion that contact infection may have been a source. At any

rate the cases occurring from June 22nd to July 8th were probably due to some common source. The cases occurred as a rule among the poorer classes, those whose surroundings were unhygienic. The large number of privies, and the fact that fowls or animals were kept on or near the premises in nearly every case is significant. It has been suggested that the stable fly, a cousin to the tse-tse fly is the host. The surroundings in nearly all cases were such as to lead to a multiplication of flies of all kinds. The extent of the paralysis that will be permanent cannot be estimated at present, since improvement has been noted as long as a year and a half after the subsidence of acute symptoms.

RECOMMENDATIONS.

The recommendations made to attending physicians are here emphasized.

1. The patient should be isolated from the other members of the family and the house quarantined for three weeks from the onset of acute symptoms. The quarantine should not include the bread-winner, who should nevertheless be warned to keep away from children.
2. All cases should be promptly reported. Cases suspected of being infantile paralysis but in whom no paralyzes have as yet developed, should be reported. Abortive cases should also be reported as such.
3. The care of the patient should include the destruction by chemical agents or fire of all discharges, particularly those from nose and throat. It might be well to have nurses and other members of the family use a mouth and nose wash of 1% H_2O_2 .
4. Urotropin has been recommended by a committee appointed by the American Medical Association. It may be given to children who have been exposed or those who show some of the symptoms of onset, and should not be continued for longer than a week.

NOTE. Thanks are due to the health officer and physicians at Barberton who have been of great assistance in obtaining this data. Since this report was written two more cases appeared, both of whom died.

ACUTE POLIOMYELITIS AT DAYTON.

On September 2nd, 5th, 6th, 16th, 17th and 18th, the epidemiologist visited Dayton by arrangement with the Secretary, to investigate outbreaks of acute poliomyelitis and cerebro-spinal meningitis. A brief report of these investigations follows:

The first object of these investigations was to learn whether cases of infantile paralysis were being reported as cerebro-spinal meningitis, and vice versa. By means of bacteriological measures and clinical investigation of cases, it was found that both of these diseases were prevalent in Dayton.

A circular letter was sent to every physician in Dayton, urging that all cases, whether typical or abortive, be reported to the local health department, and stating that both these diseases are contagious and have been made reportable by the State Board of Health. The results of this investigation are as follows:

Acute poliomyelitis has been moderately prevalent in Dayton since the early part of June 1912. Cerebro-spinal meningitis has been present for about the same period and has been responsible for a number of deaths. Acute poliomyelitis has been practically limited to the eastern part of the city, whereas the distribution of cerebro-spinal meningitis has been more diffuse. A number of cases in which a diagnosis of cerebro-spinal meningitis had been made were found to be infantile paralysis and the reverse may have been true in some instances.

It is intended to summarize all cases of acute poliomyelitis which have occurred in Ohio in 1912 in one report, which necessarily cannot be made at this time.

ACUTE POLIOMYELITIS AT GREENVILLE.

On September 20th, at the request of Dr. Baker, a member of a committee appointed by the Darke County Medical Society to investigate the situation as to acute poliomyelitis, the peidemiologists met with that committee to discuss the question. The report follows:

The attention of the Darke County Medical Society had been directed to the number of cases of acute poliomyelitis and diseases simulating this disease, reported during their last meeting. A committee of three was therefore appointed to investigate the situation, in an endeavor to seek uniform reports and to enforce the usual methods of prevention.

The county was divided into three parts, each represented by a member of the committee. Every physician in Darke County was to be visited personally, and blanks supplied by the State Board of Health were to be filled out.

A meeting to take place in October or November is to be devoted to the subject of acute poliomyelitis, and an endeavor will be made to secure the services of an authority on the subject from Cincinnati or elsewhere.

It is very gratifying to find such a deep interest taken in the subject of acute poliomyelitis from the standpoint of prevention, by the members of the Darke County Medical Society.

ACUTE POLIOMYELITIS AT ROSEVILLE.

On September 7th, at the request of Dr. H. T. Sutton, member of the State Board of Health, the epidemiologist visited Roseville to inves-

tigate some cases of a disease simulating acute poliomyelitis. The report follows:

There have been several cases of acute poliomyelitis reported in Roseville during the week ending September 7th. There has been some doubt upon the part of the physicians at Roseville as to the diagnosis in these cases. It was believed that all the cases were of the same nature, however.

Two cases were investigated. In the first there was weakness in the muscles of the neck and moderate temperature, prostration hyperesthesia, and a typical motor (flaccid) paralysis of the muscles controlling dorsiflexion of the foot. The second case seemed to have no paralysis as yet, but there was some weakness and other symptoms typical of the acute stage. It is impossible to say, however, that this was a case of infantile paralysis. Such a diagnosis seems to be the only one possible. A fuller report of this investigation will be made later.

The usual methods of prevention were enforced and the health officer instructed in the details of his duty.

DIPHTHERIA AT DAWSON.

On October 3rd, at the request of Dr. Charles Gaines, the epidemiologist visited Dawson to investigate a supposed case of diphtheria. The report follows:

The patient is a girl 7 years old, who attended school at Houston. On September 29th, she was taken sick and vomited several times. A physician was called, who pronounced the case to be diphtheria. As there were no other cases of diphtheria at the school she attended, or in the vicinity, and as she had not been away from home during the previous week, the health officer questioned this diagnosis.

On examination no membrane was seen in the throat, nor was there any injection. The tonsils were somewhat enlarged, but were not the seat of any inflammation. There was a muco-purulent discharge from both nostrils. The voice was somewhat husky, but there was no inflammation of the glands of the neck or other signs indicative of membranous croup. Swabs from the nose and throat were prepared and examined in the hygienic laboratories.

The school at Houston, which draws its pupils from a four-mile radius, had suffered very much in attendance because of this case of diphtheria. It was therefore thought wise to assure the superintendent that there was no need to close the school, as the case was quarantined.

The report from the hygienic laboratories shows that Klebs-Loeffler bacilli were present in the secretions from the nose, but absent in the secretions from the throat.

CONCLUSIONS.

1st. At the time of examination the patient showed no clinical signs of diphtheria.

2nd. The report from the hygienic laboratories would show that this is a case where the bacilli remained in the nose for some time after the acute symptoms had subsided.

3rd. The patient should be isolated and the house quarantined until at least two negative examinations of the nose and throat secretions, several days apart, have been submitted.

DIPHTHERIA AT FAIRPORT HARBOR.

On March 18th, in compliance with the request of the health officer, the epidemiologist visited Fairport Harbor to investigate an outbreak of diphtheria.

Five cases of diphtheria have developed at Fairport Harbor within the past two weeks, all in children of school age. Death resulted in one case as the specific antitoxin was not administered early enough owing to a delay in the proper diagnosis. It was also because of the delay in diagnosis that the disease was allowed to spread. The cases are all properly isolated and quarantined. As some of the cases arose in school, there was a general opinion that the school should be closed. This, however, was advised against, as the last case developed several days ago and it is improbable that many more cases will arise unless there are convalescent carriers. From conversation with the health officer and physicians it is evident that there have been unrecognized cases of diphtheria here in the past.

The health officer was advised to disinfect the school room in which the children had taken sick, and the physicians were requested to assist the health officer and report all cases, even where the diagnosis was in doubt.

No further trouble was experienced and the diseases quickly died out in Fairport Harbor.

SCARLET FEVER AT BUTLER, RICHLAND COUNTY.

On April 20th, at the request of Mr. Long, health officer, the epidemiologist visited Butler to investigate a supposed case of scarlet fever. The report follows:

The patient in question, a boy 5 years of age, had recently returned from California, passing through Columbus on the 13th instant. The history of the case was inconclusive, the mother stating that the boy had vomited on the 12th or 13th instant and on the 14th had erupted. He had been dosed with several remedies prescribed by druggists and friends

previous to his coming to Butler. He was subject to "spasm," which, from the mother's description, must have resembled epileptic seizures.

A physician who had seen the patient on the 16th and 17th instant stated that a typical scarlatina form rash was present, with sore throat and "strawberry" tongue. The temperature, he stated, was 103 degrees F. Another physician who had seen the case on the 15th instant stated that the rash did not in any particular resemble scarlet fever; that the boy's temperature had not been higher than 101 degrees F; that he had not had sore throat, and that the pupils were paralyzed so that they did not react to light or accommodation. He also stated that the boy was delirious. On examination the patient was found to be mentally deficient, his development not corresponding with that of a normal boy of the same age. The pupils were equal and active. The temperature was normal. The body and extremities were covered with a discrete papular eruption resembling that of measles, but with no characteristic arrangement. There was no erythema except over the front of the chest, which was probably due to a strong turpentine stupe which had been on the chest for several hours.

The mother stated that this rash had been present since the 14th instant and had not changed. No desquamation was present in any situation. Several children who had associated with the patient on the night of the 14th instant were reported well.

For these reasons it was impossible to confirm the diagnosis of one of the physicians that scarlet fever had been present, but from the history given by this physician it is quite possible that this disease may have been present in addition to the rash noticed.

The eruption noticed on examination might have been caused by quinine or other drugs commonly used in the preparation of proprietary mixtures for colds, etcetera.

The health officer was instructed to continue the quarantine until it was assured that no desquamation would take place, if there had been scarlet fever; but the head of the family was allowed to resume work in the factory.

Since this investigation was made, the health officer has reported that no further cases of scarlet fever or other contagious diseases have developed, and that the quarantine has been removed from the patient's house.

SCARLET FEVER IN ETNA TOWNSHIP, LICKING COUNTY.

On February 27th the epidemiologist visited Etna at the request of Mr. Eimswiler, clerk of the board of health of Etna township, Licking County, for the purpose of conferring with the board of health regarding the quarantine regulations in some cases of scarlet fever in Etna village and township. The report follows:

On February 20th, several cases of scarlet fever broke out among children of one of the upper classes in Etna school. The school was closed and remains closed at the present time. The board of health, through their health officer, requested that the parents of school children keep such children at home for a period of ten days, since it was supposed that all these children had been exposed.

At the present time there are ten cases of scarlet fever, eight in Etna village and two in the township. There have been no new cases for three days, and no exposures have taken place. The board of health was advised to enforce the full period of quarantine required by law for those exposed, when any family refuses to obey the orders of said board. They were also advised not to reopen the school until a period of ten days had elapsed from the time of the last exposure.

The board of health and health officer of Etna Township are doing everything in their power to restrict scarlet fever in that community, and the situation is well in hand.

SCARLET FEVER IN GRANGER TOWNSHIP, MEDINA COUNTY.

On December 1st, in compliance with the request of Mr. G. G. Guncha, health officer of Granger Township, the epidemiologist visited that locality to determine the nature of an infectious disease said to be prevailing there. The report of this investigation follows:

There are at present in Granger Township three children suffering with a disease said to be scarlet fever or German measles. These three cases were examined and the disease pronounced scarlet fever. Two other cases were seen, which were said to have suffered with the same symptoms, but in which a diagnosis of German measles had been made.

At the time of examination there was no desquamation, nor any signs or symptoms which might lead to a diagnosis. While it is probable that the disease from which all these children suffered was the same, on the other hand it is entirely possible for German measles and scarlet fever to have been prevalent in the same community at the same time.

The school had been closed by the health officer, and it was recommended that if no further cases arose it could be re-opened December 8th. A public gathering which was to take place December 6th was postponed, as the health officer stated that in his opinion there were cases of scarlet fever in Granger Township which had called no physician and had not been reported, and any public gatherings might prove to be a source of infection.

In conclusion, it should be emphasized that mild cases of scarlet fever are just as dangerous as those of the most severe type, and should be quarantined and isolated in the same way.

SCARLET FEVER IN HOLLOWAY, BELMONT COUNTY.

On May 4th, 1912, at the request of Mr. O. A. Van Fossen, health officer, the epidemiologist visited Holloway to investigate the prevalence of scarlet fever and measures employed in its restriction. The report follows:

Holloway is a village with a population of 786, in Belmont county. The following cases of scarlet fever have been reported to the health officer and quarantined:

April 19	3 cases	May 2	1 case
April 27	2 cases	May 3	2 cases
April 29	4 cases		

There have been no deaths.

With the exception of two cases, all the patients have been under 10 years of age, and with one exception all are pupils of the local school. The school has been closed for 7 days and no exposures have taken place since closing. The usual quarantine and isolation were enforced in each case, with one or two exceptions. In the case of one patient, the head of the family was allowed to live in a separate room, not coming in contact with the patient in any way, and to resume his work in the railroad yard, this work not bringing him in contact with children in any way.

The patient in this case, however, against the wishes of the health officer, was allowed to play in the rear of the house, where he was in danger of coming in contact with some of the neighbors' children. It must be emphasized that when privileges such as were granted the head of this family are enjoyed, any disobedience of the health officer's instructions must lead to their instant withdrawal. The patient in this case suffered with an ear discharge, which is a most dangerous vehicle for the infection of others.

In all other cases quarantine and isolation were vigorously enforced and conscientiously carried out.

Since seven days have elapsed since the date of last exposures, it is unlikely that many more cases will develop. The health officer was advised that the school could be re-opened when a period of ten days had elapsed since the date of the exposures, if in the meantime no other conditions arose which would contra-indicate this step. It might also be mentioned that the council of the village took independent steps in the management of this epidemic, and as the measures they suggested were somewhat at variance with those advised by the health officer, who was acting in lieu of a board of health, it must be emphasized that in such a situation the health officer has supreme authority.

There was some question among the laity as to the correctness of the diagnosis of scarlet fever, but although many of the cases are mild, the clinical picture is typical of scarlet fever.

SCARLET FEVER AND DIPHThERIA AT LEESBURG AND FAIRFIELD TOWNSHIP, HIGHLAND COUNTY.

On December 7th, in compliance with the request of the health officer of Leesburg and Fairfield Township, the epidemiologist visited that locality to investigate an outbreak of scarlet fever and diphtheria. The report follows:

On November 8th, a case of scarlet fever was reported at Leesburg and since that time three others have occurred. On November 11th, a case of diphtheria was found and this led to the infection of six others.

The health officer insisted upon strict quarantine of the patients and other members of the family and exposures in each case, but in some instances the diagnosis was disputed. The school was closed for a period of three weeks and no cases of scarlet fever or diphtheria have been reported since.

Diphtheria patients were dismissed by means of cultures and this had occasioned some dissatisfaction.

The diagnosis of scarlet fever was confirmed in each instance. Family and patient were instructed as to the proper methods of quarantine. The health officer was upheld in his contention that the cultural was the only intelligent method of dismissing diphtheria cases. It was further stated that if the exposures submitted to examination by culture, and such cultures proved negative, it would not be necessary to insist upon the full period of quarantine.

The health officer was informed that it was his duty to insist upon early reports of all contagious and infectious diseases which are by law reportable.

No further spread of these diseases is anticipated.

SCARLET FEVER IN LODI AND HARRISVILLE TOWNSHIP, MEDINA COUNTY.

On April 16th, the epidemiologist visited Lodi, at the request of A. W. Kinney, health officer of Lodi, and Harrisville Township, to investigate an epidemic of scarlet fever. The report follows:

Scarlet fever has been prevalent in Lodi and Harrisville Township for some weeks. In Lodi it has been under control, all cases having sought a physician's advice and been reported and quarantined. No cases took sick-at school.

In Harrisville Township, however, it was stated that there had been a number of cases in families who had not consulted a physician, so that the disease spread before the authorities could enforce proper precautions. When at last a physician was called five cases were found.

Some of these had been at school although showing symptoms of the disease, and the health officer deemed it necessary to close the schools. The school board, however, represented by a sub-director, re-opened the school against the wishes of the health officer. On the 16th of April, the following conditions were found: Four cases stated to have had scarlet fever were examined. Three were now convalescent and showed no symptoms of the disease that were pathogenic. One, however, showed the fine, branny desquamation so characteristic of scarlet fever. For this reason, and the history given by the parents, the attending physician's diagnosis was confirmed. The sub-director was interviewed and instructed that when a contagious disease is epidemic, the question of closing and opening the schools is entirely a matter pertaining to the board of health or health officer having jurisdiction. The school was again closed and preparations made for thorough disinfection before re-opening it. Unless there are cases who have not called a physician, there is little likelihood of the disease spreading any further. The diagnosis of scarlet fever was disputed by the laity for the reason that some of the cases had been very light. Pamphlets on scarlet fever were left with the health officer to distribute.

OUTBREAK OF SCARLET FEVER AT READING AND ADJOINING COMMUNITIES.

On January 2nd, 3rd, 4th, 5th, 6th and 20th, 1912, the epidemiologist visited Reading to make an investigation of an outbreak of scarlet fever. The investigation occupied a week, and was made in compliance with the request of a member of the board.

The report follows:

REPORT OF AN INVESTIGATION OF SCARLET FEVER AT READING.

Scarlet fever has been unusually prevalent in Ohio during the past winter, and reports at the present time indicate that the disease is not markedly on the decrease. The mortality rate has been high, although the disease has been present only in a mild form in many places.

It was with these facts in mind that the State Board of Health, at its meeting in Toledo, March 21st, recommended the publication of this report, realizing that the conditions obtaining at Reading would be similar to those in many other communities, and that the general causes underlying the spread of scarlet fever are everywhere the same.

The attention of health officers is directed especially to mild forms and to typical cases of the disease, as well as to a too short period of isolation and quarantine. Scarlet fever is a dangerous, contagious disease, and physicians failing to report their cases imperil the public health.

The report follows:

Reading, a village of 3,985 inhabitants, is situated in Hamilton County nine miles northeast of Cincinnati, to which it is directly connected by railroad and traction lines. It is contiguous to Lockland, and is in close proximity to a number of other villages, — Glendale, Wyoming, Carthage, Arlington Heights and Hartwell. This proximity is of importance in studying the prevalence of contagious disease in any one of these communities, for there is a considerable amount of interurban traffic, and many of the industrial class live in one community and work in another. Reading has comparatively few large manufacturing plants, so that the majority of the inhabitants, who to a large extent belong to the working classes, follow their occupations in Cincinnati or some of the neighboring villages. All of these communities may be summed up in the term "Greater Cincinnati," and it is a question of importance whether contagious diseases are as a rule carried from Cincinnati proper to the less congested centers of population or *vice versa*. Contagious diseases do not respect municipal boundaries in their spread, but on the other hand health departments are strictly bound by such limits.

Having then a number of communities in close proximity to Cincinnati and contiguous, each community with a separate health department, it is obvious that the restriction of any contagious disease is possible only when each health department is efficient. If in one community there is a weak or inefficient department, then that community is capable of nursing the contagium and infecting the other communities which by careful and rigid regulation have rid themselves of the disease.

A brief statement of the generally accepted beliefs concerning the factors having to do with the transmission of scarlet fever is necessary.

Scarlet fever is one of the most common and contagious of the exanthematous diseases. It is a disease of childhood and is most fatal to those under ten years of age, but it may attack adults. The specific cause is at present unknown, but it is well recognized that the contagium is given off with the secretions of the nose, mouth and respiratory tract, and also the particles of skin thrown off during convalescence. The poison is very resistant, and clings to furniture and clothes so that the most perfect disinfection may be useless. The disease may therefore be conveyed by a third person, and is stated to have been conveyed by milk.

After a child has been exposed, from one to seven days may elapse before symptoms of the disease make their appearance. This is known as the period of incubation. The most common initial symptoms in a child are vomiting, fever, sore throat, and in a day or so a scarlet rash and coated tongue which has a "strawberry" appearance. After the rash disappears, desquamation or peeling takes place. This is the course taken by a typical case, but atypical or abortive cases may exist and are recognized by all authorities. There may be fever, vomiting and sore throat, but the rash may not appear or be evanescent. Desquamation

may follow, and in these mild forms some of the complications of scarlet fever may be observed. An abortive or typical case should be suspected when there has been an exposure, and when within the period of incubation the child is seized with some of the symptoms of scarlet fever. Particularly is this true when some complication follows or the contagium is passed on to some other child. In such cases a diagnosis is justifiable *even if the rash is not observed*. We have no reason to suppose that these mild or abortive cases are any less dangerous to others than the most severe case, and the same precautions should be taken with them. It is accepted by authorities everywhere that the patient should be isolated for a period of six weeks from the onset of symptoms. Lastly, scarlet rash, scarlatina, canker rash, etc., are synonyms of scarlet fever and are not separate diseases, and a physician who makes a diagnosis of *scarlet rash*, and fails to report a case for this reason, is much too ignorant to practice medicine. No medical school teaches that scarlet rash, scarlatina, scarlet fever, etc., are separate diseases, nor is there any reliable authority anywhere that would vouch for such a view.

SYNOPSIS OF DATA OBTAINED.

When the investigation was started, it was decided to secure the following information from each patient: name, age, sex, address, date of onset, symptoms of onset, complications, sequelae, physician's diagnosis, investigator's diagnosis, name of physician, history of contact with other cases, direct or indirect, source of milk supply, school or other private or public institution attended, occupation, occupation of head of family and other working members, previous cases in the house or family, visits and visitors for ten days prior to illness, and such other details as in the opinion of the investigator seemed important in relation to any particular case. The history of contact was only secured for the ten days preceding the onset of symptoms, as this covers the longest period of a possible period of incubation.

Owing to the fact that the cases in many instances had occurred some months previous to the investigation, and had been frequently so light as to attract little interest, many of these details had been forgotten or never noticed. Some of the first cases had not called a physician, and these were located only by chance. It is probable that there were some mild cases that were not discovered, but only an intensive investigation covering every house in Reading could secure these. Enough information has been secured to locate the causes of the continued prevalence of scarlet fever at Reading.

CASES BY MONTHS.

In August there were ten (10) cases occurring as follows:

August 15.....	1	August 20.....	1
August 17.....	1	August 27.....	1
August 18.....	2	August 28.....	1
August 19.....	2	August 30.....	1

Reports: 2 of these cases were promptly reported.

1 was reported nine days after the onset when death occurred.
7 were not reported.

2 of these were cases in which the diagnosis was in doubt.

In 1 the physician was not called.

1 was a very mild case.

1 was diagnosed as diphtheria.

3 were undoubted cases of scarlet fever and there is no excuse for their non-report.

September.

6 cases which occurred in September were investigated:

September 1.....	2
September 15.....	2
September 30.....	2

Total 6

Reports: 2 of these were reported promptly.

4 cases were not reported.

1 of these was probably a case of diphtheria.

3 of these were not diagnosed as scarlet fever.

October.

October 2.....	1
October 12.....	1
October 30.....	1

Total 3

Reports: 2 cases were reported promptly.

1 case was not reported.

November.

November 4.....	1
November 6.....	1
November 7.....	1
November 8.....	1
November 15.....	1

Total 5

Reports: The 5 cases were all promptly reported.

December.

December 4.....	1
December 21.....	1
December 26.....	1
December 27.....	1

Total 4

Reports: 3 cases were promptly reported.
 1 was pneumonia, and so not reported.

January.

January 5.....	2	January 15.....	1
January 7.....	2	January 17.....	2
January 8.....	2	January 19.....	1
January 12.....	2	January 27.....	2
		No date given.....	6

Total 20

Reports: 18 cases were promptly reported.
 2 cases were not reported. Of these—
 1 was diagnosed quinsy—and in
 1 there was no diagnosis made.

February.

February 1.....	1	February 8.....	2
February 3.....	1	February 10.....	1
February 5.....	1	February 15.....	2
February 6.....	1	February 17.....	1
February 7.....	1		—

Total 11

Reports: 11 cases were promptly reported.

Briefly, those physicians who were in the habit of reporting their cases did so promptly. The cases that were not typical were of course not reported so promptly, if at all.

Thus fifty-nine (59) cases of disease suspected of being scarlet fever were investigated, and of these forty-nine (49) were found to be true cases, and some others were probably atypical and abortive cases. There was no question raised concerning the cases diagnosticated as "quinsy", "pneumonia" etc., for it was impossible to investigate these clinically so long after the disease had occurred, and the physician's diagnosis was accepted as final.

The 59 cases occurred in 29 families.

SEX.

30 of the cases were males.

29 of the cases were females.

AGE.

The average age was 9.2 years.

The youngest was fourteen months and the oldest 50 years.

From 1- 5 there were 19 or.....	32.2%
From 6-10 there were 25 or.....	42.3%
From 11-15 there were 11 or.....	18.6%
From 16-20 there were 1 or.....	1.7%
From 20-50 there were 3 or.....	5 %

MORTALITY.

There were three (3)* deaths from scarlet fever and one (1) from diphtheria in Reading since August, 1911.

Estimating the rate from those cases which were true cases of scarlet fever, the percentage of deaths was approximately 5.5%.

*Another death has since been reported.

COMPLICATIONS AND SEQUELAE.

- 1 case of articular rheumatism.
- 2 cases of otitis media, one bi-lateral.
- 3 cases of nephritis, two very severe, with anasarca.

Besides these, there were many who complained of "earache", but who showed no discharge at the time of the investigation, and many cases of glandular involvement.

DIAGNOSIS.

Six cases were diagnosed as "scarlet rash" by the attending physician. Needless to say these cases were not reported.

DISINFECTION.

The health officer disinfected in every case that was reported to him.

Concurrent disinfection was unsatisfactory in many instances, as was isolation of the patient from the remaining members of the family. That this is so was demonstrated not only by the number of cases which occurred secondary to a previous one in the same house, but also by the large number of "return" cases.

CONTACT.

Thirty-seven (37) of the cases gave a history of direct contact with a patient suffering with scarlet fever or convalescing, and these were almost all second cases in a family. Those giving no history of direct contact were probably infected in the following manner:

INDIRECT CONTACT.

- Two of the early cases gave a history which contained no suggestive information other than they had been at Carthage Fair within two days of their illness.
- Nine gave a history of being at St. Peter and St. Paul School a day or two previous to their illness. Nothing else could explain their infection and there were a number of children attending the school who had recovered from scarlet fever, and in many instances had returned to school sooner than was absolutely safe.
- Two gave a history of working at the box-shop of the large bottle-works at Reading. They had been nowhere else. The girls at this shop were in the habit of drinking out of a bottle which was used by all, and there had been a case here in December, from Lockland.
- Three gave no history of contact with anyone, or of being anywhere, that seemed suggestive. Their brothers and sisters, however, attended the school above mentioned, and might have carried the contagium home.
- One gave a history containing only the information that his brother worked at the box-shop above mentioned.
- Three gave no suggestive history. They live in a locality where scarlet fever was prevalent and played with their friends, some of whom were recovering from that disease.

MILK.

- 22 secured their milk from distributor No. 1.
- 6 secured their milk from distributor No. 2.
- 4 secured their milk from distributor No. 3.
- 1 secured their milk from distributor No. 4.
- 3 secured their milk from distributor No. 5.
- 3 used none.

None of these dairymen had any sickness among their families or employes, nor was there a history of any illness previously, and the only manner in which milk could have distributed the infection was in the early part of the epidemic, from those cases which were not reported, to others. When a case was reported, the health officer informed the dairyman supplying the house that no bottled milk was to be left, but the milk was to be poured into a proper receptacle placed outside by the family quarantined.

LENGTH OF ILLNESS.

The average length of isolation and quarantine was three weeks. This includes all the cases. The average length of quarantine of those cases reported and quarantined was 3.6 weeks.

DOUBTFUL CASES IN DETAIL.

Here the salient facts regarding those cases for whom no physician was called, or in whom the diagnosis was in doubt, are presented. The numerals represent the first case in each family. Letters represent other members of the same family.

Case 1.

M. G., aged 13, male.

Onset on August 17th, with severe headache, vomiting and sore throat. The physician who was called could make no diagnosis at first, but later said it resembled scarlet fever. There was no eruption (?) but the child had an extremely red skin, said to be due to the "fever". The illness lasted four days, and no desquamation was observed. There were no complications. There was no history of contact, direct or indirect, with any other case, but the child had been to Carthage Fair forty-eight hours prior to the onset of symptoms.

Case 1 a.

C. G., aged 11, male.

Onset August 18th, with vomiting, sore throat and fever.

Had an eruption which the physician stated was "scarlet rash." This was followed by desquamation. Contact with Case 1.

Case 1 b.

R. G., aged 15, male.

Onset on August 19th, with fever and sore throat. Had an eruption similar to that on Case 1 a. No desquamation was noticed. This illness of two or three days' duration was followed by a mild attack of articular rheumatism. Contact with Case 1, 1 a.

Case 1 c.

J. G., aged 9, male.

Onset on August 19th. Merely complained of a slight fever and headache on that day. Did not have sore throat, eruption or desquamation.

The four cases above were not reported, the physician stating, with some justice, that there was insufficient evidence for a diagnosis. The fact that cases 1 a and 1 b both had eruptions, and that one desquamated and the other suffered with a common complication of scarlet fever, coupled with the grave suspicion that other cases were infected from these, place the diagnosis, at the present time at least, beyond doubt.

Case 2.

R. B., aged 4, male.

Onset on August 18th, with sore throat, fever, headache and vomiting. Had an eruption which corresponded with that of scarlet fever. No physician was called and the case was not reported. The rash lasted a day or so, then disappeared and the child was well in four days. There was no history, other than a visit to Carthage Fair on the 16th, that would explain the infection.

Case 2 a.

This was investigated simply because it followed case 2 in the same house. The diagnosis of the physician in attendance was "diphtheria," hence the case has no place here.

Case 3.

This also was a case of diphtheria, investigated simply because a case of scarlet fever occurred shortly after in the same family. There was no reason found to differ with the attending physician in his diagnosis. The case, however, was not reported until death, which occurred nine days after the onset.

Case 3 a.

R. F., aged 14, male.

Onset on August 27th, with fever, vomiting and sore throat. There was a crimson rash and desquamation followed. The attending physician made a diagnosis of "scarlet rash" and did not report it. The patient, however, was kept isolated for a period estimated by the mother to be six weeks. History of contact with cases 1 and 2.

Case 5.

E. S., aged 15, male.

Onset on August 20th, with sore throat, vomiting and fever. There was an eruption, and the attending physician made a diagnosis of "scarlet rash," but omitted to report it. It was only by accident that it was brought to the investigator's attention. Probably contracted the disease from case 3 a. This child went back to school on September 15th (?), and so was probably still capable of infecting others.

Case 6.

J. B., aged 7, male.

Onset on September 30th, with vomiting, fever, headache and sore throat. Complained of "earache" just when the temperature had fallen. No physician was called, and

the illness lasted only three to four days. There was no history of a rash, but the child was said to have been quite flushed with the "fever." There was a coated tongue. No desquamation was noticed. The only suggestive history in this case was that he had been to St. Peter and St. Paul School just prior to his illness.

Case 6 a.

A brother to case 6. Suffered with the same symptoms October 14th, but had no earache. The illness only lasted a day, and no desquamation was noticed.

Case 6 b.

A sister to cases 6 and 6 a. Suffered with the same symptoms as her two brothers on October 14th, but in addition these symptoms were shortly followed by a discharging ear. The illness lasted two or three days. No physician was called.

Case 6 c.

This case, a brother to the above, had pneumonia several weeks after his brothers' and sister's illness, and his history has no connection with the other cases.

Case 11.

E. A., aged 7, male.

Onset on December 4th, with fever, sore throat and vomiting. A physician was called, but could make no diagnosis. Another was called, but he also failed. There was no history of a rash or reddening of the skin, neither was there a history of peeling. The first physician called afterward stated that the disease in its onset resembled scarlet fever. In a short time the patient was observed to be suffering with anasarca due to a nephritis. The physician in discussing this case stated that the boy was susceptible to sore throat and nephritis, and that this had been only one of several attacks. The patient had been to St. Peter and St. Paul School just prior to his illness, and had also played with case 6.

Case 13.

R. C., aged 8, female.

Onset on January 3rd, with fever, sore throat and coated tongue. The attending physician made no diagnosis, and of course did not report the case. The child was said to have been very "red in the face." She was in bed three days and kept away from school for two weeks. She had been going to St. Peter and St. Paul School. There was no history of desquamation or of any complications.

SCARLET FEVER IN COMMUNITIES ADJOINING READING.

Hartwell.

Scarlet fever has not been unduly prevalent in Hartwell, and the few cases which occurred since December, 1911, can be traced to the negligence of a family who did not call for medical attention when their child took sick. The physicians were in the habit of reporting typical and atypical cases, and the health officer used every means in his power to restrict the disease.

The cases are here presented in such detail as bears on the question of transmission of the disease.

CASES IN 1911.

April.

Case 1.

The history of this case contained only the information that the patient had been to Cincinnati just prior to the onset of the symptoms.

December.

Case 2. December 7.

Male, aged 5.

This case occurred in a family who belong to a cult which does not recognize the physical existence of disease. No physician was called, and two other children continued at school while this patient was showing all the symptoms of a typical case of scarlet fever.

Case 2 a.

Female, aged 8.

This case occurred in December, shortly after the first—(case 2.) No physician was called, and the remaining child continued at school

Case 2 b.

Female, aged 15.

The health officer heard it rumored that this child had scarlet fever, and at once took a physician to the home to investigate. The disease was pronounced scarlet fever, and the father admitted that the other two children had suffered with the same symptoms previously. The house was quarantined and the school closed for three days and thoroughly disinfected.

These three cases were probably infected at Reading, or rather, the first case was infected there and transmitted the disease to the others, as the family have friends there with whom they frequently visit.

January, 1912.

Case 3.

Female, aged 8.

The history of this case contained the suggestive information that friends in the family work at the large bottle works in Reading.

Case 4.

Female, aged 14, colored.

This patient went to school, and was seized with the following symptoms shortly after case 2 b was taken sick there: vomiting, fever and sore throat. There was no characteristic rash, and the physician was not able to make an absolute diagnosis, but reported the case as "suspicious," a commendable proceeding.

Case 5.

Male, aged 8.

Took sick with scarlet fever when case 2 b was going to school, or shortly after.

Case 5 a.

A sister to case 5. Took sick within a few days of case 5.

Case 6.

Female, aged 4.

Lives in the same house as case 4. Took sick shortly after case 4.

Sycamore Township.

Here the important details of each case are presented.

Case 1.

P. S., aged 4, male.

Onset on September 30th, 1911, with fever (no sore throat, no vomiting and no eruption observed). Was only ill about two days, and no desquamation was noticed. No physician was called. There was no history of direct contact with a scarlet fever case. The patient had been in Middletown and Reading just prior to his illness.

Case 1 a.

F. S., aged 6, female.

Onset on October 14th, 1911, with feverishness, and rash which the attending physician said resembled "scarlet rash" but failed to report. The illness was followed by desquamation, and is said to have lasted only two days.

Both these children were kept away from school for only a few days.

Case 2.

I. G., aged 7, female.

Onset November 1st, 1911, with fever, sore throat and headache. A day later the characteristic rash developed, and in a few days desquamation set in. The child later complained of "earache." The case was reported, and the house quarantined and placarded. The quarantine was maintained for three weeks.

There was a history of contact with case 1 a.

Case 2 a.

M. G., aged 3, female.

Onset December 31st, 1911, with vomiting, sore throat and fever. A characteristic rash developed, and the physician reported the case as scarlet fever, the family being duly quarantined.

Case 2 b.

M. G., aged 2, female.

Onset January 17th, 1912, with vomiting, fever and sore throat, and later characteristic rash and desquamation. Later suffered with a discharge from the ears.

These three cases, 2, 2 a and 2 b, occurred in the same family, and disinfection was performed and the quarantine lifted after case 2 and 2 a, so that the last two cases belong to that class known as "return" cases.

Case 3.

J. R., aged 5, male.

This child attended school on the 9th of January, 1912, and on the 25th was seized with all the characteristic symptoms of scarlet fever. He had in the meantime played with cases 2, 2 a (?), who were still evidently capable of transmitting the infection, as a sister of theirs, case 2 b, took sick January 17th.

On January 16th, the other six children of the family, cases 3 a, b, c, d, e, all took sick, and the disease in each case was reported as scarlet fever. The head of the family had a dairy, from which he sent milk to a retailer, who distributed this and other milk in Cincinnati. This retailer was in the habit of pasteurizing his milk by the "flash" method. No further cases of scarlet fever occurred among the retailer's customers, and in the meantime the health officer of Cincinnati made a personal investigation of the dairyman's premises. No more milk was allowed to be sent away until the family left the premises, and the latter were thoroughly cleaned and fumigated. This was done.

Lockland.

The salient facts in each case are here presented.

Case 1.

N. R., aged 2, female.

This patient had scarlet fever on April 8th, 1911, and was reported and quarantined.

Case 1 a.

N. R., aged 2, female.

These children (1 and 1 a) were twins. The latter took sick on April 11th, 1911.

The family was visited by an aunt, whose children already had scarlet fever before they reached Lockland, the rash being developed. They lived in Cincinnati for several weeks prior to this visit.

Cases 2—2 a.

These patients, brother and sister, were taken sick about August 18th and 19th, respectively. They complained of sore throat and were ill for only a few days. No physician was called, and the cases were of course not reported, as scarlet fever was not thought of, as they had no visible evidence of fever or eruption. About September 11th, they became "swollen", and a physician who was called stated that they were both suffering from nephritis. One of them was in convulsions, said to be uremia. They had been visited by a boy who was a resident of Cincinnati, and who was attending Carthage Fair. This boy was convalescing from scarlet fever, and picked scales from his hands in the presence of his hosts. He was promptly sent home.

Cases 3—3 a.

G. F., W. F.

These cases, sister and brother, took sick on November 6th and 7th, respectively. The diagnosis of scarlet fever was made, and the cases duly reported. They had been attending St. Peter and Paul School at Reading up to the date of their illness, and were probably infected there.

Cases 4—4 a.

C. W., female, aged 23.

J. W., male, aged 26.

These cases took sick on December 11th and 26th, respectively. Case 4 had been working at the box department of the large bottle works at Reading, and gave no further suggestive history.

Case 4 a was infected from his wife (case 4), whom he had nursed. These cases were reported and quarantined for the usual period.

Wyoming.

Only one case has occurred here.

Case 1.

M. Mc., aged 5, female.

Onset on February 9th, 1912, with fever, sore throat, characteristic rash and coated tongue. This case was reported on February 10th. The disease lasted until February 29th. The child attended a private school in Wyoming only a short distance away from home, and no other cases of scarlet fever had antedated this one. The only suggestive history was that the child had been to Cincinnati, returning by the interurban line on February 3rd.

Arlington Heights.

At the time of investigation, only one case of scarlet fever had developed.

Case 1.

J. B. P., aged 7, female.

This patient was taken sick on January 28th, and on February 1st the disease was reported as scarlet fever. The history was that she had been to school on Miss Street in Lockland, and nowhere else during the ten days preceding her illness. Her father, however, a traveler, had returned from a trip on January 27th or 28th. He had suffered with a severe sore throat and had a discharging ear when he returned home. The health officer had placarded the house, but had made no arrangements for provisioning the inmates. When the investigation took place the mother of the patient was found at the store purchasing necessities. This is indeed a deplorable state of affairs.

SYNOPSIS.

Scarlet Fever in Communities Adjoining Reading.

1911.	
April	3
August	2
September	1
October	1
November	3
December	5
Total	15 cases.
1912.	
January	15
February	1
Total	16 cases.
Total for 1911, 1912.....	31 cases.

REPORTS.

Seven (7) cases were not reported. In only one of these cases was a physician called, and he was doubtful, with some reason, concerning the nature of the disease.

CONTACT.

Seventeen (17) gave a history of direct contact with a patient in the acute stages of the disease or during desquamation. These were principally second cases in a family.

Four (4) were probably infected at Cincinnati or on the interurban cars.

One (1) was probably infected at Carthage Fair.

Four (4) probably received the infection at Reading.

Two (2) received their infection at Hartwell School.

Two (2) at school in Sycamore Township.

One (1) at St. Peter and St. Paul School at Reading.

COMPLICATIONS.

In two (2) the disease was followed by nephritis.

In one (1) the disease was followed by otitis media.

GENERAL CONSIDERATION.

Scarlet fever has been unduly prevalent in Reading since August 15th, 1911. While some cases in Reading and vicinity were found to have contracted the disease from cases in Cincinnati, and in others, too, this was probably the place where they became infected, it is not possible to say that Cincinnati did not suffer in the same measure from cases in Reading, either unrecognized, unreported or freed too early from quarantine. To discover this would mean an investigation of some months, and enough facts have been secured to make it evident that Cincinnati and adjoining communities suffer from such cases, unreported or unrecognized, forming a vicious circle of infection.

It does not appear that health departments are to blame for the undue prevalence of scarlet fever, for the health officers of the suburban communities are unfortunately not physicians, and must depend on reports from medical men of their cases of contagious disease.

ATYPICAL CASES.

It is not necessary to analyze each atypical or abortive case in detail. Where a case suffered from some common complication of scarlet fever, and was the means of infecting another patient, this would place the diagnosis beyond a doubt. Quoting from Nothnagel's Encyclopedia of Practical Medicine, where cases which fail to show a fever, or have no eruption, or angina are discussed the author states:

"That both the latter do occur is taken for granted by the majority of observers." He also quotes Thomas, who says: "Even an angina that occurs during a scarlatinal epidemic is suspicious." He also quotes Bohn, "We must only accept a case as one of scarlatina if, during an epidemic, especially in families where either early or late a distinct scarlatinal case appears, cases occur in which nothing more is lacking from the fully developed picture than the confidently expected exanthem."

Every writer on scarlatina mentions these cases, and they are probably more numerous than is thought, as most physicians do not take into consideration the whole epidemic, but only their particular patients. Many authors also state that mild or abortive types of the disease are especially common among adults, who without being actually sick enough to give up their work, are able to transmit the disease, possibly in virulent form, to others. A glance over the preceding pages of this report will show the number of atypical cases, and the connection they had with the spread of the disease.

It must be emphasized here that there is no disease known as "scarlet rash," and a physician making such a diagnosis does so through pitiable ignorance, or a desire to evade quarantine.

The length of quarantine was in almost every case too short, as was proven in a large number of instances, by the fact that such patients communicated the disease to others when released. In hospitals where such cases are treated, the patient is not released for six weeks at least from the onset of symptoms,—this with a view both to lessen the number of cases of nephritis, and to prevent the transmission of the disease to others. This period is lengthened should any desquamation continue, or a discharge from the buccal, nasal or aural cavities exist. Unfortunately, the laws of our state deal only with the length of time quarantine shall continue *after disinfection*, a period of ten days. This is to avoid releasing the family before the incubation period of a possible new case is up.

CONCLUSIONS.

1. The first cases at Reading were infected at Carthage Fair. The fact that a boy suffering from scarlet fever attended this fair is to be noted in the report. It is possible that there were many other similar cases.

2. Some cases were infected and others were *probably* infected while in Cincinnati, or in journeying there.

3. In Reading, the St. Peter and Paul School was the most prolific source of infection,—not due to any fault of the school, but rather because cases not reported, and others, were allowed to return to school before their power of infecting others had entirely abated.

4. The bottle factory at Reading was another source of infection. A case mentioned in the report which occurred at the factory in December is to be noted.

5. Some cases in Sycamore Township, being dismissed too early, transmitted the disease to children at Reading.

6. Cases in *adjoining communities* owed some cases to Reading. The factors to which the continued prevalence of scarlet fever in Reading and adjoining communities (but especially in Reading) was due, were, in the order of their importance:

1. Cases not reported to the various departments of health.
2. *Atypical and abortive cases.
3. Too early dismissal of cases.

RECOMMENDATIONS.

In view of these facts it is recommended:

1. That in the event that it is discovered that a case has not been reported, the health officer secure the services of a physician to investigate, and if it is found that the case is one of scarlet fever or other contagious disease, the attending physician be at once prosecuted, if competent evidence can be procured to show that the physician knew or should have known the nature of the disease.

2. That the importance of reporting atypical as well as typical cases of scarlet fever be urged upon physicians. For this purpose a placard bearing the words "Contagious Disease Within" might be used, so that the physician need not await typical symptoms before reporting the case as one dangerous to the public health. As soon as a positive diagnosis can be made, this card should be replaced by one bearing the name of the disease.

3. That a regulation requiring an arbitrary period of quarantine be adopted by the various boards of health in the communities in which this investigation took place. This period should not be less than thirty days from onset of symptoms, making a total of forty days when the ten days required by law after disinfection are added, and that the clause "If at that time desquamation has ceased, and no discharge from the throat, nose or ears, or unhealthy condition of these parts exist", be included in such regulation.

4. That in no case shall a house be disinfected or a person released from quarantine until the attending physician, or a physician appointed by the board of health for the purpose, has reported in writing to the health officer that the patient has fully recovered and that the house and contents are ready to be disinfected. No person who has had

* Twelve (12) atypical cases were found among the 90 cases investigated, or 13.3%, and the percentage is probably higher than this since the investigation included several cases not scarlet fever.

scarlet fever will be considered as fully recovered until desquamation is completed, and there is no longer any discharge from the nose, throat or ears.

5. That no child, having suffered from scarlet fever, be readmitted to school without a written certificate signed by the health officer, that he or she has been quarantined for the full period of time mentioned above.

6. That teachers in the public and parochial schools should be required to immediately report to the health officer any child who is sent from school with any of the symptoms of a contagious or infectious disease.

It is likewise recommended that during the prevalence of a contagious or infectious disease in the community, such teachers shall be required to report any child who has been absent for a period of three days, unless the actual cause of absence is known to the teacher.

NOTE: Some of these recommendations are now in force in Reading, and there has been a notable improvement in the promptness of reports. The situation there and in adjoining communities appears to be well under control. [This has been borne out by further reports.]

SCARLET FEVER AT WEST SALEM.

On January 10th, in compliance with the request of a physician, the epidemiologist visited West Salem to investigate an outbreak of scarlet fever. The report follows:

There have been two reported cases of scarlet fever in West Salem, but it is said that a large number of cases have not been diagnosed or reported, although attended by physicians.

The two reported cases of scarlet fever were visited and the diagnoses confirmed. The cases were properly isolated and quarantined.

Three other houses where there was said to be scarlet fever were visited. In no one of these cases was any evidence of the existence of scarlet fever found. Only the attending physician had seen these cases and his diagnosis was probably correct. The health officer, a physician, had not visited these cases before sending for aid from the State Board of Health.

The usual measures used to prevent the spread of scarlet fever were recommended to the health officer.

SCARLET FEVER AT THE OHIO SOLDIERS' AND SAILORS' ORPHANS HOME, XENIA.

On February 1st, in compliance with the request of Dr. Grube, the epidemiologist visited the Ohio Soldiers' and Sailors' Orphans' Home, at Xenia, to see what could be done to aid in the isolation and treatment of scarlet fever, with a view to preventing its spread among the 700 children at the Home. The report follows:

The hospital system at the Home consists of one main building and four cottages. These cottages are used to isolate children having any contagious disease. While there is ample room for a number of children with scarlet fever or measles, yet at certain times these cottages are filled with such cases, leaving no room for isolating those who have been away and may have been exposed. The main hospital is used as an operating room, and for diseases other than contagious diseases.

Two children were in the main hospital at the same time, in the same room. One was seized with symptoms of scarlet fever, and was promptly removed to one of the cottages. There was no room other than in the main hospital to isolate the one exposed until the possible incubation period had elapsed.

In order to prevent the spread of scarlet fever among the children, it is absolutely necessary to isolate all contacts, those who have been exposed at the Home, and those who have been exposed while on the outside. This cannot always be done properly at the present time, owing to the congested condition of the cottages. The buildings themselves are amply large, but are not subdivided so as to be most useful.

In view of these conditions, it is recommended as a temporary measure that one or more of the cottages be subdivided by means of a partition, which shall be so placed that no communication shall exist between the two parts so subdivided, and each shall have a separate entrance.

In view of the large number of children coming and going to and from the hospital sometimes, from large centers of population, the need of a detention building where such children could be kept pending the possible development of contagious diseases, is manifest. It is therefore recommended that such a building be constructed as soon as possible.

The serious results that might ensue from an infection with a contagious disease of a number of children in such a Home, cannot be over-estimated, and no precautionary measures can be too strict. The length of time of isolation of a case of scarlet fever should be increased to at least six weeks, and longer, should any discharge from the nose, throat or ear continue or desquamation still exist. This period of isolation is recommended for the mild as well as the severe cases.

AN OUTBREAK OF SCARLET FEVER AND DIPHTHERIA AT XENIA.

On October 15th, 1912, in compliance with the request of the health officer, the epidemiologist visited Xenia to investigate an outbreak of scarlet fever and diphtheria.

His report follows:

Xenia is a city of 8,706 inhabitants, situated in the central part of Greene County. Scarlet fever and diphtheria were not prevalent until September, but nine cases of the former and three of the latter developed between September 1st, and the date of this investigation. Each case was visited and in every instance the methods of isolation, quarantine and release were found to be satisfactory. In one case no antitoxin had been administered to a case of diphtheria, and this fact was commented upon and criticised. In case of diphtheria, cultures were made for releasing the patients from quarantine. The cases of scarlet fever and diphtheria had not developed simultaneously, but at regular intervals during a period of a month and a half. Two of the cases of diphtheria developed in one of the schools, and the health officer immediately took steps to prevent the spread of the disease among the school children. That these were successful is evidenced by the fact that no further cases, which could have become infected at school, developed.

There was considerable alarm among the laity and the members of the school and health boards, who feared the development of an epidemic. The question of closing all schools and other public gatherings had arisen, and many were in favor of this step. To discuss this question the boards of health, education and some members of the council met with a number of citizens, and the meeting was addressed by a number of physicians and the epidemiologist. It was the consensus of opinion that there was no immediate necessity of closing public gatherings, since the cases of scarlet fever and diphtheria were under proper quarantine and isolation, and the proper precautions were being taken. Should further cases arise proving that the measures of prevention were insufficient, the closing of public gatherings might become necessary. The epidemiologist urged upon physicians the early use of antitoxin in cases of diphtheria. Those who attended the meeting appeared to be satisfied with the results and the alarm was lessened.

The Ohio Soldiers' and Sailors' Orphans' Home was also visited and conditions found to be the same as on a previous visit. While the total hospital space is amply large, it is subdivided in such a manner that it cannot be properly utilized. There is need of a building to receive children who enter the Home for the first time, or who have visited some of the larger centers of population. This is necessary to prevent the development of some contagious diseases among the other children where so many would become exposed.

There are several cases of scarlet fever and diphtheria in the Home at present but proper precautions have been taken and there is no cause for undue alarm. Other steps recommended were:

1. Strict isolation of contacts.
2. Isolation of frank cases.
3. A sufficient length of quarantine to guard against infection from the nasal and pharyngeal secretions.
4. In diphtheria a search for the specific bacillus in convalescence and suspected carriers.

NOTE: The measures recommended for these outbreaks of scarlet fever and diphtheria were efficacious in preventing any further spread.

SMALLPOX AT BONO AND IN JERUSALEM TOWNSHIP, LUCAS COUNTY.

In compliance with the request of Dr. Oscar Hasencamp, the epidemiologist visited Jerusalem Township on January 6th, 1912, to ascertain the situation existing in regard to smallpox and the measures taken to abate the disease.

The report follows:

Smallpox has been prevalent at Bono and in Jerusalem Township for a number of weeks, the date of the first cases not being known. There was some hesitancy on the part of the physician in charge of the first cases to pronounce the disease smallpox on account of the light character of the symptoms, and for this reason there were a large number of exposures before active measures were taken to restrict the disease. Many people objected to vaccination, so that it was not until late in December that this method of restricting smallpox was used. Most of the cases contracted the disease in Bono, a settlement of approximately 250 people, but there were cases in other parts of Jerusalem Township on the main thoroughfare to Curtice. On January 6th, the recently elected health officer, Mr. David Aubry, reported that there were twenty-one houses under quarantine, nineteen of these having actual cases of smallpox, and two others being quarantined for exposure to that disease. He stated, and this was confirmed by the reports of the physicians in charge of the cases, that all exposures were under quarantine and all suspicious cases had been thoroughly investigated. The physicians also stated that there was now no doubt concerning the diagnosis.

The township board of health and the health officer met in the town hall on January 6th, and were instructed in the requirements of the law concerning smallpox and the measures necessary to restrict that disease. Approximately all the inhabitants of Bono have now been vaccinated and many others in the township.

It does not appear that there is any cause for alarm at the present time, for the health officer has the situation well in hand. Had the precautions taken in December and early in January been practiced when the first cases broke out the township would have been saved much trouble and expense.

SMALLPOX AT BRADFORD.

On September 9th, at the request of a resident of Bradford, the epidemiologist visited that village to investigate some cases of a disease simulating smallpox.

The report follows:

The outbreak at Bradford had its inception as early as the middle of June, 1912. The first cases were supposed to have been imported from Ada. Three of these patients, who were in the acute stages of the disease, were visited, and all showed symptoms and signs of a well-marked attack of discrete smallpox of a mild type.

In conversation with the health officer, Dr. Foreman, it was learned that quite a number of these cases had occurred during the summer. It was his opinion that all these cases were of the same nature.

No vaccination had been performed, nor were the usual precautions taken, and it is not due to the health department at Bradford that the disease did not spread more widely. The health officer was informed that vaccination should be urged as much as possible; that the usual precautions of quarantine and isolation must be taken, and that weekly reports of all cases of the disease on special information blanks should be submitted to the State Board of Health.

On August 20th, a case of smallpox had been investigated in Newberry township, and in this instance a history of exposure to some cases at Bradford had been given. Since the history also contained reference to a visit to Dayton, where the disease was prevalent, it was thought that the latter and not the former is responsible for this case; but it is probable that this view is erroneous.

The health officer of Bradford was of the opinion that not more than twelve cases had occurred at Bradford during the summer, but promised to send a complete report of the cases.

SMALLPOX AT BUTLER TOWNSHIP, MONTGOMERY COUNTY.

On May 14th, 1912, at the request of a number of citizens, the epidemiologist visited Butler Township, Montgomery County, to investigate smallpox said to be prevalent there.

The report follows:

Two cases of smallpox were reported to the health officer, Dr. W. H. Riley, on May 10th, and in seeking the source of these cases the following information was secured:

An employe of the Gas Company in Dayton, who lived in Vandalia, was occupied as a solicitor during the outbreak of smallpox in Dayton. Toward the end of February he took sick, with backache, headache and fever, and in a few days an eruption appeared upon his forehead and to a lesser extent upon his body. He remained at home for three days and was seen once by the family physician, who pronounced the disease chickenpox. This patient stated that he had smallpox eight years ago; an inspector of the State Board of Health from London having pronounced his disease smallpox. On examination he was found to bear recent scars of smallpox eruption upon his face and nose. He stated that these marks had been left by the disease in February, and that no marks had been left by his illness eight years ago. He was at no time seriously ill, and did not remain in bed.

Following his illness his two children were taken sick, and the diagnosis of the attending physicians was again chickenpox. These cases occurred toward the end of March.

A lady in the township was exposed to these cases, and in two weeks began to suffer slight backache and headache, a rash appearing on the forehead in three or four days. At this time she saw a physician, who stated that she had probably been poisoned, but asked her to call again in two or three days. This she did not do.

On April 17th, the sewing circle met at her home, and many people noticed her eruption, which was then in its height.

Twenty-three days after these exposures, the cases mentioned as being reported on May 10th, were seen by a physician. He pronounced them smallpox, and at once reported them. Both these patients were women who had attended the sewing circle, and both had taken sick approximately fourteen days after their exposure. On examination, both these patients presented typical and well-marked symptoms of discrete smallpox in the pustular stage.

There have been a few exposures to these cases since the onset of the disease, and these exposures have all been vaccinated and are undergoing a quarantine of observation. One of the exposures showed some of the symptoms of the onset of smallpox on May 12th, and this patient was isolated, but at that time no diagnosis could be made. When the cases of smallpox were reported to the health officer on May 10th, twenty-three days had elapsed since the members of the sewing circle were exposed, so that it is very improbable that any of these cases will develop smallpox, and quarantine at this time is useless. Complaint was made that the quarantine was not being properly observed, but when these complaints were investigated, they were found to rest entirely upon hearsay

evidence. It was also stated that one of the families quarantined for smallpox had sent butter to Dayton to be sold, and this matter is being carefully investigated by the township health officer.

CONCLUSIONS.

1. It is probable that there have been four cases of smallpox in which a correct diagnosis was not made, and these cases were responsible for the further spread of smallpox in Butler township.

2. It does not appear from the information secured that there will be any further cases of smallpox.

3. The proper precautions were taken by the health officer when smallpox was reported to him.

SMALLPOX IN BRUSHCREEK TOWNSHIP, HIGHLAND COUNTY.

On September 4th, at the request of the Secretary, the epidemiologist visited Brush Creek township to investigate an outbreak of smallpox.

His report follows:

The outbreak of smallpox in Brush Creek township was confined to a small settlement called Elmville. There were ten cases in all, nine of these being adults. The disease is believed to have been imported from Dayton, and the first cases came down on August 1st.

Besides the houses which are quarantined for smallpox there are a number of exposures who have been vaccinated and quarantined. A visit to a number of these indicated that vaccination had been satisfactory, and no complaint was made of the quarantine or treatment.

The cases of smallpox seen were typical of the late stage of the disease. The distribution of the lesions were normal, and the history was typical of smallpox.

The results of this investigation would lead to the belief that the outbreak had been attended to carefully, and all the usual precautions taken. There is no reason to believe that more than one or two cases will arise in the future. In conversation with the health authorities of Dayton, the history of importation was corroborated.

SMALLPOX IN CANAAN TOWNSHIP, MADISON COUNTY.

In compliance with the request of Dr. Jenkins, township health officer, the epidemiologist visited Canaan township on January 22nd, for the purpose of confirming the diagnosis of Dr. Jenkins on a case which he reported as smallpox.

The case was a negro boy aged sixteen. He gave a very indefinite history, yet this was to be expected, because of the general lack of intelligence. There were more or less characteristic pustules on the wrists and fore-arms of the patient, and a certain degree of secondary fever. This, combined with the history taken by the attending physician, was considered sufficient to confirm the diagnosis of smallpox. The local board of health was instructed to carry out the usual measures to restrict the spread of smallpox in the community.

It was further reported by the health officer that there were a number of cases of chickenpox in the community. The board of health was instructed in the law regarding chickenpox, which is a reportable disease, and should be quarantined in the same manner as smallpox. In this connection, it would be well for the local board of health to inform the physicians in the township that smallpox is present therein, and that all cases of chickenpox or other disease simulating smallpox should be investigated and treated with the greatest care, as mild forms of smallpox are very difficult to differentiate from cases of chickenpox.

SMALLPOX AT DAYTON.

On April 23rd, at the request of a member of the Board, Dr. Grube and the epidemiologist visited Dayton to investigate the continued prevalence of smallpox.

The report follows:

Smallpox was first reported to the health officer of Dayton in the week ending February 10th, 1912. Three cases were reported that week, and to March 2nd, fifteen more cases were reported. On March 16th, a number of cases were reported from one of the parochial schools, and since there had been some question as to the diagnosis of certain mild cases, the epidemiologist, upon request of the health officer, visited Dayton on April 8th, and confirmed the diagnosis.

Since that time the disease has been gradually subsiding, and at the present time there are nine cases at the smallpox hospital, several of whom will be dismissed on Saturday, the 27th, and two houses quarantined because of exposures.

There are a number of persons who have been vaccinated and are undergoing a quarantine of observation.

The causes of the spread of smallpox in the first place were mentioned in a previous report:

- 1st. Cases in which no physician was called;
- 2nd. Unrecognized cases;
- 3rd. Failure to secure a history of all those exposed.

It is believed that the disease will gradually subside, since nearly all the cases reported since April 6th, have been among those who were

known to be exposed, and in the case of one family the history of exposure at the parochial school was overlooked because of a clerical error.

The system at present in force appears to be efficient but could be further strengthened by having headquarters separate from the health office, so that the routine business of the latter would not interfere with the clerical work incident to the former. It would also be wise to have a day book in which all matters pertaining to the epidemic could be entered so that no detail would be overlooked.

The physician in charge of the epidemic should have absolute control and full responsibility.

Should smallpox continue to be prevalent in Dayton, it would be wise to construct a detention hospital for suspects. A building separate from other dwellings could be rented, or a floored tent could be used for this purpose.

In conclusion, it is evident that reports of the prevalence of smallpox in Dayton from outside sources have been grossly exaggerated, and one reason for this appears to be that the Dayton newspapers have failed to publish any official statements from the local board of health as to the situation.

The total number of cases that had been reported to the health office to April 22nd was 129, and nearly 20,000 persons have been vaccinated.

SMALLPOX IN FAIRFIELD TOWNSHIP, MADISON COUNTY.

On March 26th, at the request of F. M. Stickley, health officer of Fairfield Township, the epidemiologist visited Lilly Chapel, in that township, for the purpose of investigating an alleged outbreak of smallpox.

The report follows:

Three cases of a disease simulating smallpox were investigated, two of these in Lilly Chapel village and one in Fairfield Township. The diagnosis of smallpox was confirmed in each case. There was a history of exposure to a case which had previously been investigated at West Jefferson.

Case No. 1:

This occurred in a child 14 years of age. There was a pustular eruption on the forehead, face and extremities, and this, together with the history of severe lumbar pains, headache and prostration four days before the onset of eruption, made the diagnosis plain.

Case No. 2:

This occurred in a boy 14 years of age. The eruption in this patient was fully matured, and consisted of discrete pustules plentifully distributed over the face, back and extremities.

Case No. 3:

In this patient, a young man 18 years of age, the pustules had either burst or dried up, and the patient was convalescent. The distribution of eruption was similar to that in the other cases.

These three cases had been reported to the health officer as soon as the diagnosis was made. As the physician in the last two cases was called only after the eruption had fully matured, many exposures have taken place. The health officer was instructed to quarantine all exposures who had not recently been vaccinated, or who refused re-vaccination and the quarantine of observation.

The president of the board of education, Dr. Kerr, was advised to have a resolution adopted by the board of education, to allow only those children who had been recently and successfully vaccinated to attend school. The school had been closed on account of the prevalence of German measles, and it was advised that the school be re-opened after a thorough fumigation.

It is stated that there had been other cases of a disease simulating smallpox, but as these occurred sometime ago and were now convalescent, nothing could have been learned by investigation at this late date.

Stringent measures are necessary to restrict the spread of smallpox in Fairfield Township, because of the large number of exposures, and the board of health should insist upon early reports of all cases of disease, especially among those exposed to smallpox, from all physicians.

SMALLPOX IN JEFFERSON TOWNSHIP, FRANKLIN COUNTY.

On January 17th, the epidemiologist visited Jefferson Township to investigate some cases which had been reported to the local health authorities as smallpox, but in which the diagnosis was in doubt.

The report follows:

The family, in which these cases occurred, lived about one mile from West Jefferson. About two weeks previous to the outbreak, a laborer employed by the family had been in Oklahoma in a neighborhood where smallpox was present. He stated that neighbors of his were quarantined for this disease. At the present time the mother shows characteristic symptoms of smallpox, having several well-defined pustules on the face and arms. From the history given by other members of the family, it is evident that these two have been similarly afflicted, and this is corroborated by the family physician. The local board of health was instructed as to the measures of restriction to be enforced among those who have been exposed to the disease, as well as in the case of the family afflicted.

While the number of exposures during the onset of the disease was numerous, this is not a case where the disease has reached its most infectious stage, so that little further trouble is anticipated.

REPORT ON SMALLPOX AT KENMORE.

On July 16th, at the request of Dr. Alspach, the epidemiologist visited Kenmore to investigate an outbreak of smallpox.

The report follows:

Kenmore is a village of 1,561 inhabitants, situated in Summit County midway between Barberton and Akron. The majority of the population work at the various manufacturing plants in Kenmore and on the outskirts of Akron.

About the end of May, there came to Kenmore from Kentucky, an adult male, whose purpose was to join a circus with which he had been previously connected. He was at that time suffering with an eruptive disease, which physicians in Kentucky had stated to be chickenpox. He was examined in Kenmore by another physician, who also made a diagnosis of chickenpox, but his illness was severe enough to prevent his joining the circus. Seventeen days afterward the entire family with whom he was living contracted an eruptive disease, which was also diagnosed chickenpox by the attending physician. On July 3rd, the fact that a number of people, including adults, were suffering with symptoms of a disease simulating smallpox, was brought to the attention of the health officer. He immediately made an investigation and quarantined four houses. Some of the patients were then in the third week of their illness. It was found that a number of people had been exposed to the patients, and it was attempted to secure a correct history of all exposures, and quarantine or vaccinate them.

The health officer stated that so far as he could find out, none of those suffering with smallpox had left their residences, but some of the exposures who worked at Akron and Kenmore had been traveling to and from their places of work. Some of the exposures had taken place seventeen days previous to the investigation, and these were disinfected and discharged. Further, ten of the exposures were vaccinated. So far as could be learned, no patient with smallpox had left town. The last case to develop occurred on July 8th, in the family of a baker, and exposures from this case were vaccinated or quarantined. Altogether, there have been twenty-five cases of smallpox.

The disease has been confined to one part of the village and the number of exposures is small.

RECOMMENDATIONS.

Because of the fact that so few have been vaccinated as a result of this epidemic, it is recommended that an endeavor be made to enforce vaccination as widely as possible. The health officer and board of education should unite in enforcing vaccination of all school children.

Because of the long period during which there was no quarantine enforced, it is possible that there may be further cases of smallpox, and

the health officer should endeavor to locate all such cases and make further investigation as to exposures.

The health officers of Akron and Barberton have been notified that there is smallpox at Kenmore, and are on the lookout for cases.

SMALLPOX IN NEWBERRY TOWNSHIP, MIAMI COUNTY.

On July 27th, in compliance with the request of Dr. Chas. E. Gaines, the epidemiologist visited Covington to investigate a supposed case of smallpox in the neighboring township.

The report follows:

The patient was a young man living in Newberry Township, Miami County. His present illness started about July 13th with a definite chill, fever and pain in the back and limbs. The temperature continued, and weakness supervened. The eruption was first noticed on the 23rd, and its distribution was irregular, being most abundant on the abdomen, from which it appeared to spread. At no time were the lesions on the face numerous. The eruption was at first maculo-papular. There was no definite history of exposure to smallpox, but the patient had been in a community where smallpox was prevalent approximately two weeks prior to the onset of symptoms.

On examination, the patient was found to be a young man of about 25 years of age. His temperature was 102 degrees F. The eruption consisted of thin brown crusts, most numerous on the abdomen and outer sides of the limbs, but present elsewhere, and also on the face, forehead and palms in small numbers. There was a well-marked vaccination scar on the left arm. Vaccination, however, had been performed twenty years ago. There was a history of chickenpox several years previous to the present illness.

In view of the character of the symptoms and eruption, the diagnosis of smallpox was confirmed. This was probably the abortive type of the disease rather than the varioloid, since in the latter the pustula stage is not lacking as in this instance.

It was recommended that exposures, including all members of the family, should be vaccinated. This was done. The quarantine which had been practiced prior to this visit was continued. The case was reported to the township health officer who made arrangements for the care of the patient and family quarantined.

There seems no likelihood of any further spread of the disease.

SMALLPOX IN TIFFIN.

On October 30th, in compliance with the request of the health officer, the epidemiologist visited Tiffin to investigate an outbreak of smallpox.

His report follows:

On June 7th, one case of smallpox occurred in Tiffin, which was traced to a traveling circus that had passed through sections of Kentucky and Ohio recently. It was also responsible for an outbreak of smallpox in Kenmore. On June 19th, two more cases appeared and on July 13th, another. No more cases were known to exist until October 26th.

At the time of the investigation there were twenty-one cases in Tiffin. Eight of these were examined and the diagnosis of smallpox confirmed. The principal of a school in which there had developed several cases of smallpox was then visited. The school had been closed and it was recommended that the children be vaccinated and the school reopened.

At a meeting of the boards of health and education it was recommended that, *as vaccination is the only preventive for smallpox*, a regulation be adopted by the board of education, that no child be admitted to school without a certificate from a physician of recent and successful vaccination. The president of the board of education promised to see that this was done. Further it was recommended that all exposures who refused vaccination be quarantined for the full period required by law. The board of health was urged to see that vaccination was placed within the reach of all by supplying the vaccine without cost.

These measures were effectual in preventing the spread of smallpox, as only a few cases appeared thereafter.

SMALLPOX IN ZANESVILLE.

On November 30th, at the request of Dr. G. W. McCormick, health officer, the epidemiologist visited Zanesville to investigate an outbreak of smallpox.

His report follows:

Smallpox was not known to exist in Zanesville until November 28th, but several cases were reported on that date, and since then twelve cases in all have been reported to the health department. There was a question concerning the correctness of the diagnosis, and considerable agitation against certain of the measures proposed by the health department for the restriction of the disease. A number of the cases were visited, some of them in the acute stage and some convalescent, and the diagnosis of smallpox was confirmed.

The department of health had, in conjunction with the department of education, issued an order that all children attending school be required to exhibit a certificate of successful vaccination. They also urged upon manufacturers that they endeavor to enforce general vaccination among their employees.

The question of closing public gatherings had also arisen, but in the meantime the health officer and his assistant had closed a number of motion picture shows, and disinfected them.

The situation at Zanesville appears to be somewhat serious, since investigation proved that smallpox had been present there for a period of at least eight weeks before it had been reported. A number of cases also occurred in the colored section and it is not known how widely exposures may have taken place. This being the case, it is necessary to use all possible measures for the control of the disease.

Vaccination should be urged and placed within the reach of all. The question of closing public gatherings can be better answered when the extent of the disease is better known, but should a number of further cases develop, it would probably be advisable to close public gatherings for a period of two weeks. All exposures should be quarantined and vaccinated, preferably the latter.

The health department of Zanesville, consisting of the health officer and one sanitary policeman, may become unable to cope with the situation because of lack of men. The board of health of Zanesville should see that a sufficient force is provided for dealing with the situation properly.

TYPHOID FEVER AT CIRCLEVILLE.

On September 8th, 1912, in compliance with the request of a citizen of Circleville, the epidemiologist visited that city to investigate an outbreak of typhoid fever.

His report follows:

From August 4th, to September 4th, seven cases of typhoid fever occurred at Circleville. The patients were all boarders or roomers at a boarding house on Main Street. Shortly before the outbreak a district nurse from Cleveland who had recently suffered with typhoid fever, roomed in the boarding house. All other guests and servants were known not to have had typhoid fever during the past year.

Dairy products, the city water and other food were easily ruled out since none of these were used alone by the guests of this boarding house, and others would have also fallen victims of typhoid fever had these been the source. There remained the cistern, water from which was used to wash dishes and in the kitchen. This cistern was situated close to a sewer which was laid at a higher level than the cistern. In the past this sewer had become blocked and had leaked. The water from this

cistern was examined at the Hygienic Laboratories and found to be polluted. Examination of dairy products used in this house revealed nothing of importance as far as the source of this outbreak was concerned.

Only three of the patients remained in Circleville, and the stage of their illness rendered personal inquiry impossible. The diagnosis was however confirmed.

The proprietor of the boarding house was told not to use water from the cistern for any purpose and asked to keep the house closed to boarders for two weeks. This was done, and the cistern abandoned. No more cases of typhoid fever were reported.

It is probable that some person, a carrier of the typhoid bacillus, infected the cistern which then led to infection of food or vessels. The boarding house is conducted with due regard to cleanliness and no personal blame is attached to the proprietor.

TYPHOID FEVER AT DELAWARE.

On June 14th, at the request of the health officer, Dr. Miller, the epidemiologist visited Delaware to investigate an outbreak of typhoid fever. The report follows:

Typhoid fever has not been prevalent in Delaware during the early months of 1912. On June 1st, however, five cases were reported to the health officer. They were all in the district where the employees of the Dennison Tile Company live.

The health officer immediately made an investigation, and found that they were all using water from wells, the public supply not having reached that section. He found further that some of these wells were polluted. Other data which he collected threw no light on the cause of the outbreak.

The wells mentioned above are all about the same depth, and the character of the soil is such that they are very liable to contamination, and there is abundance of opportunity for contamination, as poorly constructed privies are within the reach of almost every well.

It was found upon investigation that one of the cases reported was not typhoid fever. The health officer was advised to send specimens of blood from some of these patients to the hygienic laboratories, in order to establish the diagnosis.

As an emergency measure it would be well to restrict the number of these wells to one or two, which, because of their construction and situation, are less liable to contamination than the others. Should none of these wells be free from contamination, it would be advisable to disinfect the water by means of chlorine.

It is strongly recommended that the public water supply be placed

within the reach of the people in this part of Delaware, and it must be understood that any other measure is recommended only for emergency purposes.

TYPHOID FEVER AT MARYSVILLE.

This investigation was made in compliance with the request of the health officer of Marysville, and occupied four days.

On November 29th, a survey of the various distributing dairies and supply houses was made with especial reference to the possibility of contamination of the milk, the presence of a possible typhoid carrier at the dairies, and the number of cases of typhoid fever on the routes of each of the distributing dairymen.

Examinations of the public water supply had been made prior to this investigation in the Hygienic Laboratories through the Division of Engineering, and comprised samples taken from public fountains, private taps and at the water plant. The results of these examinations revealed no evidences of pollution, and it was thought that a preliminary survey of the milk supplies might lead to the source of the outbreak so that emergency measures might be instituted and the outbreak abated. No such result was attained and an epidemiological study was then undertaken which occupied three days, December 9th, 10th, and 11th. The data collected during the course of this study forms the basis of the report which follows:

Marysville, the county seat of Union County, had in 1910 a population of 3,576. The railroad service consists of branches of two railroads, the C. C. C. & St. L., and the T. & O. C. There are approximately five miles of well-paved streets, and a public water supply which reaches a large majority of the homes. A system of sanitary sewerage is lacking, and, judging from the accumulations of filth and rubbish in the lanes, alleys, and yards, there is no efficient system of garbage collection.

Records of the prevalence of typhoid fever and of other contagious and infectious diseases have not been kept by the health department of Marysville, and this fact is responsible for the delay in investigating the sources of this outbreak and in applying preventive measures. The first essential to the efficiency of a health department lies in its ability to secure prompt and accurate reports of all diseases occurring within its jurisdiction, and there is a law enforcing this in Ohio. L. L. Lumsden, during the course of an investigation at Des Moines, called attention to the danger of non-report of cases of typhoid fever, pointing out that an epidemic may reach its maximum height before a health department is cognizant of the existence of an unusually large number of cases. The help that the State Board of Health is able to afford communities such as Marysville depends upon the care and promptness of reports from such localities.

On November 29th, the health officer was instructed to secure from physicians reports of all cases of typhoid fever, and thirty were reported as occurring between September the first and the last of November. When a personal canvass was made it was found that forty-two cases had occurred between September the first and December the fifth, including three whose onset dated in December.

TIME AND EXTENT OF OUTBREAK.

Statistics of the number of cases of typhoid fever and deaths resulting from this disease have not been accurately kept, but the State Department of Vital Statistics furnished the following:

Year.	No. of Deaths.	Representing No. of Cases.
1909	3	30
1910	6	60
1911	3	30
1912	6	60
Total	18	180

The number of cases is calculated from the number of deaths, taking 10% as the average mortality rate. If 4 is accepted as the average number of deaths from typhoid fever in Marysville, then the enormous figure of over 80 per 100,000 of population is reached, a mortality not attained by any city whose water supply is drawn from badly polluted sources.

The earliest cases that might be regarded as a part of the present outbreak occurred on August 7th, and 12th, respectively. In September three more cases occurred, the onsets dating 3rd, 7th, and 20th. The following table shows the dates of definite onset of cases occurring in October, November, and December:

Date.	Cases.	Date.	Cases.	Date.	Cases.
October 1.....	1	November 4.....	1	December 2.....	1
October 4.....	1	November 5.....	1	December 4.....	1
October 8.....	1	November 7.....	4	December 5.....	1
October 9.....	1	November 8.....	1		
October 14.....	1	November 11.....	2		
October 16.....	2	November 16.....	1		
October 18.....	1	November 18.....	1		
October 21.....	2	November 19.....	2		
October 22.....	1	November 20.....	1		
		November 22.....	1		
		November 23.....	1		
		November 24.....	1		
		November 25.....	1		
		November 26.....	2		
		November 27.....	1		
		November 29.....	1		
		November 30.....	1		
Total	11	Total	23	Total	3

There were three deaths during this outbreak. From this table it is evident that the cause of the outbreak was operative during a period of at least two months, and, accepting fourteen days as the more usual period of incubation, it would appear that from September 16th, to November 16th, is the period within which the major part of the infection took place. This outbreak, therefore can hardly be styled an "explosive" one, such as results from an infection of milk or some other widely distributed article of food or drink.

Epidemiological Data.

Age and Sex.

Ages.	Number of Cases.		Total.
	Male.	Female.	
From 1 to 5.....	1	0	1
From 6 to 10.....	3	4	7
From 11 to 15.....	3	6	9
From 16 to 20.....	6	4	10
From 21 to 25.....	4	4	8
From 26 to 30.....	0	2	2
From 31 to 35.....	0	3	3
From 36 to 40.....	0	0	0
From 41 to 55.....	1	1	2
Total	18	24	42

The number of cases under sixteen years of age is higher than usual, but the number under ten years is not excessive. In milk infections young children suffer the most, which is certainly not the case here.

IMPORTED CASES.

It is difficult to differentiate between the so-called imported cases, and those due to the local source of infection. Some investigators consider that when half of the incubation period has been spent away from home the chances that the disease was contracted abroad are 50%, and so lesser or greater according to the amount of time spent abroad or at home. The prevalence or lack of typhoid fever at the locality visited must also be taken into consideration.

Three cases were regarded as true imported cases since two of them took sick while away, while the third was at home only two or three days when he was taken ill. Two other cases were regarded as *probably* imported, since they occurred in August previous to the general outbreak of typhoid fever at Marysville, and they had visited localities where typhoid fever was endemic approximately fourteen days prior to the onset of definite symptoms.

OCCUPATION.

<i>Class.</i>	<i>No.</i>
Students, public and high school	22
House-work	6
Machinists	4
Clerks	2
Packer, telephone operator, laundry driver, laborer, waiter, and nurse, one each	6
No occupation	2
Total	42

The table of occupations shows no *unusual* distribution of cases. In every epidemic the number of cases in school children is large.

MILK SUPPLIES.

Investigation of the milk supplies comprised inspection of all dairies distributing milk in Marysville, and the sources from which the milk was derived. Attention was paid to the methods of caring for bottles and vessels used in distribution, the presence or absence of possible carriers at the dairies or supply houses, and the number of cases of typhoid fever on each route. Nothing of direct importance relating to the outbreak was revealed, but the lack of care and equipment in all of the dairies called for severe criticisms. Sterilization of the bottles was not attempted by any of the dairies, and in many instances these were even indifferently cleansed.

The daughter of a tenant on a farm from which milk was sent to

Marysville was lying ill with typhoid fever at the time of the investigation. From this farm milk was shipped to Marysville, and the father helped with the milking. As the onset of this case dated several weeks after the inception of the outbreak and no cases had arisen on the route which distributed this milk after the onset of this patient's illness no importance was attached to this finding. To prevent the danger of any future infection the health officer was requested to forbid the sale of milk from this farm unless arrangements were made to release all members of this family from the duties of milking or having anything to do with the milk. No other case of typhoid fever was found at any of the dairies or supply houses, nor could any history of a disease resembling typhoid fever occurring within recent years be elicited.

DISTRIBUTION OF MILK AMONG PATIENTS.

In this table only milk supplied to the patients within the thirty days prior to their illness is considered.

Evaporated milk was supplied during that period to.....	30 cases
Dairyman A. supplied during that period to.....	10 cases
Dairyman B. supplied during that period to.....	8 cases
Dairyman C. supplied during that period to.....	6 cases
Dairyman D. supplied during that period to.....	2 cases
The Marysville Creamery supplied during that period to.....	2 cases
Dairymen E. F. G. supplied during that period one each.....	3 cases

Note was also made of the principal source of supply used by each patient during the same period, but as that revealed nothing of importance it is not necessary to dwell on it here.

It is evident from the facts outlined above that milk can be ruled out as the primary source of the outbreak. The fact that the outbreak was not explosive in nature,—that the percentage of cases under ten years of age was not unduly large, and the wide distribution of the milk supplies support this contention. When, however, it is remembered that the bottles and other vessels used in distribution and at the dairies were not sterilized, and were even indifferently cleansed; that bottles were left at homes wherein were patients with typhoid fever; and that such bottles were returned to the dairy, filled and redistributed without having undergone any process of sterilization, it is evident that the part played by milk in causing secondary cases may have been a very prolific and important one.

WATER SUPPLIES.

The public water supply is derived from two deep drilled wells located on the border of Mill Creek. These wells, according to a report from the Division of Engineering, are well protected from surface drainage and other contamination, and this is borne out by the chemical and bacteriological results from specimens of this water which have been examined. Water is furnished the consumers by direct pressure and the

average *per capita* consumption is 144 gallons per day. Partial results of the examinations made in the Hygienic Laboratories follow:

Parts per million.

Sample Number.	Collected.	Oxygen Required.	Albumin Ammonia.	Free Ammonia.	Nitrites.	Nitrates.	Chlorides.	Bacteria per c.c.	Colon Present.
11761	3/12	.29	.042	.558	.0004	.2	21.	.2	Neg. 10 cc.
11762	3/12	.44	.032	.476	.0006	.4	17.2	2	Neg. 10 cc.
11763	3/12	.34	.034	.452	.003	.3	18.1	1	Neg. 10 cc.

In addition three samples were taken on December 12th, during the course of this investigation. They comprised water from the public fountain and private taps on the distribution system. Examination for bacteria only confirm the results hitherto attained, for the number of bacteria per c. c. was again extremely low and the colon bacillus was absent in 10 c. c. It is to be noted that samples of water were taken for examination on the third of October, when the city water, if it were the cause of the outbreak, should have shown pollution.

WELLS.

At ten of the homes of patients wells were used. Samples of water from some of these will be taken and examinations made. From epidemiological evidence alone, however, wells can be ruled out as an important cause of typhoid fever at Marysville, although some of them were evidently receiving pollution.

CISTERNS.

Twenty-nine of the thirty-seven families among whom the cases of typhoid fever were distributed, used cisterns. Water from this source was not, however, used for drinking purposes, but only for washing dishes and clothes and occasionally in cooking. In Cincinnati cases of typhoid fever occurring after the installation of a filtration system were attributed to cistern water. While there is no evidence to lead to the belief that such was the case at Marysville, a number of samples of cistern water will be examined in the Hygienic Laboratories.

ICE.

At twelve of the homes ice was used, but as the artificial product only is used and it is prepared from distilled water in a manner to preclude the possibility of infection, no attention need be paid to this subject.

RAW FOODS.

Green Groceries and Fruits.

Food of this nature was secured from the following sources:

<i>Source.</i>	<i>No. of Cases Supplied.</i>
Groceryman A. supplied	9 cases
Groceryman B. supplied	8 cases
Grocerymen C. & D. supplied.....	6 cases each
Grocerymen E. & F. supplied.....	5 cases each
Grocerymen G. & H. supplied.....	4 cases each
Groceryman I. supplied	2 cases
Grocerymen J. & K. supplied.....	1 case each

There was, therefore, no evidence to lead to any suspicion of green groceries and raw fruit, as indeed was to be expected at this time of the year.

SEWAGE DISPOSAL.

As there is no system of sanitary sewerage in Marysville, dependence is placed on privies, except by several who tap the so-called court house sewer or storm sewers emptying into the Town Run. The remainder use ordinary privies, not ordinarily provided with a watertight vault.

Most of the lanes, alleys and many of the yards in Marysville afford excellent opportunities for the breeding of house flies. The mild weather and other factors gave rise to a greater prevalence than usual of this pest, and many individuals commented on this fact. The significance of this will be commented on presently.

LOCATION OF THE CASES.

By Streets.

EAST		WEST.	
No. of Street.	Cases.	No. of Street.	Cases.
4th	1	3rd	8
5th	1	4th	7
7th	2	5th	2
	—	7th	1
Total	4	8th	5
		9th	1
			—
		Total	24

NORTH.

SOUTH.

No. of Street.	Cases.	No. of Street.	Cases.
Maple	3	Main	5
Court	1	Chestnut	1
	—	Walnut	3
Total	4	Total	9

Outside city limits 1; Total 42

This table demonstrates the fact that many of the cases were grouped together, as on West Fourth and Fifth streets.

CONTACT INFECTION.

Before going into the subject of contact infection as it applies to Marysville, it might be well to give the opinion of some authorities concerning this method of transmission. Thomas McCrae, writing in Osler's Modern Medicine, says "We are learning in how many instances there is more or less direct communication In rural communities the one patient may be the source of a small outbreak, and how often the disease is carried into a community from the outside is easily realized by a study of epidemics." Koch was one of the first to realize the possibilities of this method of infection, and from his experience gained as a member of the Trier Commission, stated that in his opinion most of the typhoid fever endemic in rural communities could be reasonably laid to this source. Jordan, Chapin and others have emphasized the importance of this method of transmission, and Chapin speaks of it as the most logical method of infection.

In Marysville the cause of the outbreak must have operated continuously over a period of at least two months. Had some source which was common to nearly all homes in Marysville been the cause, such as milk or water, we should expect a much greater number of cases from such a long continued and widely distributed infection. Also if suspicion were attached to the public water supply we should expect that the distribution of the cases would be according to density of population, and a grouping of cases such as occurred on West Fourth and Third streets could not be explained. If we regard this grouping of cases as a separate outbreak it is still difficult to explain on the basis of infection of some common article of food or drink, for it is in the nature of such infections to be temporary, and the cases on these streets dated from October 1st to November 29th, being distributed as follows:

Oct. 1.....	1 case	Nov. 16.....	1 case
Oct. 8.....	1 case	Nov. 23.....	1 case
Oct. 21.....	2 cases	Nov. 24.....	1 case
Nov. 4.....	1 case	Nov. 25.....	1 case
Nov. 7.....	2 cases	Nov. 27.....	1 case
Nov. 11.....	2 cases	Nov. 29.....	1 case

The public and other water supplies, milk, green groceries and raw fruit having been eliminated, it is natural to consider next contact infection, transmission by flies and neighborhood infection. It is so difficult to separate these classes that the first two are generally considered together. By neighborhood infection is meant the possibility of infection by actual or secondary contact,—that is, a patient's discharges are thrown into a poorly constructed privy and infect a well used occasionally by the neighbors. Or flies may feed upon the improper disposal of excreta and then infect exposed food. Promiscuous visiting, an expression of sympathy but a real menace to those who make a practice of it, was frequent in Marysville, and was probably responsible, in the younger people at least, for some of the cases.

In collecting the data which forms the basis of this report, patients or their attendants were closely questioned as to contact, more or less continuous in character, during the twenty-one days preceding their illness, with patients in the acute stage of the disease. A definite history of this nature was elicited in fourteen cases. Excepting the five cases characterized as imported, *almost every case in Marysville can be logically attributed to contact infection and to contact infection alone.*

There were 42 cases in 37 families, and the secondary cases arose after a definite period, corresponding to the period of incubation, had elapsed.

As mentioned above, fourteen gave a history of contact in the period corresponding to their incubation period with a patient in the acute stage of typhoid fever.

The grouping of the cases on West Third and Fourth streets and their dates of onset, indicate very clearly that contact and neighborhood infection were responsible for them all. These cases are practically all neighbors, their lots, either at the rear or the side, adjoining in many instances.

From these and other facts it is obvious that the only logical explanation of the cause of typhoid fever at Marysville is by contact infection.

CONCLUSIONS.

It is very improbable that the public water supply was the primary source of the outbreak.

Milk supplies, raw fruit, and green groceries may also be eliminated as important factors.

The first cases were imported, and contact infection, coupled with fly transmission, and neighborhood infection, were probably the source of the remaining cases.

RECOMMENDATIONS.

It is recommended that:

1st. The health officer of Marysville hereafter comply with the law (Section 4427) regarding the reporting of contagious and infectious diseases to the State Board of Health.

2nd. That the health officer require each physician in Marysville to comply with the law (Section 1243) and report every case of infectious and contagious disease to him.

3rd. That all dairymen delivering milk in Marysville be required by the health officer to sterilize the bottles used in distribution, and other vessels used in connection with the milk, and that some adequate system of dairy inspection be provided so that the use of modern sanitary methods by all selling milk may be enforced.

4th. That some system of garbage collection be provided so that the alleys and yards may be freed from the accumulation of filth. Garbage should be collected in tightly covered pails.

5th. That all families in which there is typhoid fever be further instructed in the care of patients and excreta, so as to minimize the opportunities for contact infection. For this purpose pamphlets, such as are issued by the State Board of Health, are suitable and should be distributed, supplementing this with the services of a well trained nurse employed by the health officer to make daily calls on all patients and explain to them and their attendants the care of the sick.

TYPHOID FEVER AT TIFFIN.

On July 18th, in compliance with the request of the health officer, the epidemiologist visited Tiffin to investigate an outbreak of typhoid fever. His report follows:

There have been few cases of typhoid fever at Tiffin during the early months of 1912. In June there were several cases, but from July 1st, to the present time fifty cases have been reported. As is usual in such situations, a preliminary survey was first undertaken, to ascertain the sources of infection, and if possible to abate them. In this survey it was found that the homes of the patients were distributed according to density of population. *All the cases, however, worked at a large glass manufacturing plant.* A few of the employes of this plant lunched together, but apart from this there was no evident common source that could be responsible for the outbreak outside the plant. Only a few of those who lunched together were stricken.

At the plant the only possible source, common to all, was the drinking water. This is supplied from two deep, driven wells. Practically all the patients, in fact all, with one possible exception, used the water from one of these wells. Water was taken from this well and examined in the hygienic laboratories. The bacteriologist's interpretation of the results of this examination follows:

"The results of the chemical analysis show that an enormous amount of organic pollution has entered this water, and that the water is still receiving a considerable amount of pollution. The chlorine is also indic-

ative of sewage contamination. There are a very large number of bacteria present and intestinal organisms are present in considerable numbers. The water is entirely unfit for drinking purposes * * * "

Examination of water from the other well revealed no evidences of pollution.

There is a trap in a sewer about fifty feet distant from the polluted well, and all the sewers draining the entire plant converge at this point. It is very probable from the nature of the chemical report that this trap was defective. The high chlorine usually indicates sewage pollution. A leakage from the sewer and consequent infection of the well water with concentrated sewage would explain an explosive epidemic.

This well was closed and ordered abandoned. The plant was allowed to reopen, since it had been closed pending the solution of the origin of the infection.

The sewers mentioned above drain only sewage from the plant. From 400 to 600 men are employed at this plant and one of them might be a carrier. One of the patients, a woman, had an attack in January which was diagnosed as typhoid fever. It is possible that she is a carrier. Examination of stools and urine would reveal nothing at present, since typhoid bacilli would be expected in the stools and urine from the present attack. There are no means of learning her previous condition.

A survey of the city water supply was also made. This is drawn from deep driven wells. The supply from these wells occasionally fails, however, and an emergency intake from the river is used. The health officer has no means of knowing when this is done. It was recommended that the valve operating this intake be provided with a seal so that it could not be opened without consent of the health officer.

TYPHOID FEVER AT WESTON.

On November 7th, 1912, in compliance with the request of a physician the epidemiologist visited Weston to make an investigation of the sources of typhoid fever.

His report follows:

Weston, a village of 913 inhabitants, is situated in Wood County at the northern part of the state. From local sources information was secured to the effect that there had been comparatively few cases of typhoid fever in Weston until September, 1912. Since that time cases have developed as follows:

September 15.....	2 cases	October 1.....	1 case
September 20.....	1 case	October 6.....	1 case
September 22.....	1 case	October 7.....	1 case
September 23.....	1 case	October 15.....	2 cases
September 24.....	1 case	October 19.....	2 cases
		October 27.....	1 case
		October 28.....	1 case
		Total	15 cases

Besides these cases eleven others arose during the same period, but outside the village limits. These cases were attended by physicians in Weston. The Widal reaction was made in a number of cases and was positive.

AGES.

From 1 to 10 there were.....	3 cases
From 11 to 20 there were.....	7 cases
From 21 to 30 there were.....	2 cases
Above 30 there were.....	3 cases
Total	15

SANITARY CONDITIONS.

A preliminary survey of the sanitary conditions was made. There is no system of sanitary sewerage in Weston, neither is there a public water supply. Ordinary privies are used by each household, and dug and driven wells supply water for drinking and other purposes. There is an open ditch bisecting the village, into which, according to local information, thirteen privies discharge their contents. This ditch has a very slight degree of fall and the current is therefore sluggish. The wells are nearly all subject to pollution from nearby and poorly constructed privies.

As ten of the fifteen cases occurred in school children the school was inspected. Apart from the methods of sewage disposal and the school well there is nothing in the sanitary conditions of the school house pertaining to the presence of typhoid fever at the school. The well is a dug well about thirty feet in depth, and not very well protected from surface contamination. The water becomes turbid after a rainfall. There is a large cistern containing urine about 150 feet distant. Two hundred feet away there is a privy.

The method of sewage disposal at the school consists in evaporating the discharges in an evaporating chamber overlying a furnace. The charred contents are removed once a week. Urine from the urinals is conveyed through pipes to the cistern above mentioned. This cistern is cleaned out once or twice a year. The cistern has been in use for some time and there is no evidence that it is watertight. The opening on the surface is loosely boarded over, and there is a strong ammoniacal odor

proceeding therefrom. No disinfection of this urine has ever been attempted.

From a rapid survey of the situation no other possible sources of typhoid fever can be located. The outbreak has occupied too long a period to be caused by some infection of a common agent such as milk or a single water supply. The fact that privies are poorly constructed and that they probably pollute wells is significant, for this in conjunction with the character of the outbreak is evidence that it is rather of a neighborhood type than a distinct epidemic. Contact infection and infection by means of infected well waters is rather frequent in the rural districts and villages.

The school well was taken as a type of the better protected wells and some of the water sent to the Hygienic Laboratories for examination. This examination revealed the presence of the colon bacillus, an unduly high amount of chlorine and an excessive amount of nitrites. The bacteriologist's interpretation is given in part. "The results of the chemical examination show that this water receives a considerable amount of organic matter, which has undergone little self-purification in its passage through the soil. * * * * The presence of the colon bacillus was detected in 1. c. c. of this water. * * * This is a polluted water, unsafe for drinking purposes and should be condemned at once."

It is very probable that the majority of the wells in Weston are subject to at least as much pollution as this school well. Measures should be taken at once to prevent the possibility of discharges finding their way from the leaky privy to the well. First all privies should be made watertight and then wells protected from surface and other contamination.

It was also recommended that some disinfectant be used in the school cistern used as a storage tank for urine.

The local department of health promised to see that these recommendations were carried out as promptly as possible.

Report of Division of Hygienic Laboratories

(779)

REPORT OF LABORATORIES.

I have the honor to submit the following report for the year ending December 31st, 1912:

The hygienic laboratories are located on the fourth floor of the Hartman Building and cover approximately 3,500 square feet of floor space. This is divided into three offices; six laboratories, one outfit, a media room and an animal room; as shown on the accompanying floor plans and illustrations. Originally this space was divided into eight large office rooms. Considerable alteration of the original floor plan of the building was, therefore, necessary in order to conveniently arrange the working space and also to utilize as much as possible the equipment moved from the former quarters of the laboratory in the State House. The floor plan of the present quarters is shown in Chart 1.

An effort was made in the installation of the laboratory to embody modern ideas of sanitary plumbing, woodwork construction and ventilating. The installation of the plumbing was under the direct supervision of the State Inspector of Plumbing. The woodwork construction is such that practically all floor space as well as cupboards, benches, etc., are accessible with the vacuum cleaning system installed in the building. The bottom of all cupboards, etc., are elevated six inches from the floor. The ventilating system is of sufficient capacity to change the air in all the laboratory rooms about six times per hour. It consists of a 27-inch exhaust fan which is installed in the attic of the building and which is connected to the laboratory by a shaft 26 inches square and about 70 feet in length, lined throughout with asbestos paper. This shaft enters the laboratory through the animal room and is carried in smaller size through the length of the laboratory into the diagnostic room. Branches from this main shaft are connected with two hoods in the chemical laboratories. Dampers are so arranged that air can be drawn from any one or all rooms at one time. The fan is controlled by a switch in the animal room.

Offices:—These consist of a reception room which opens into the general laboratory office and that of the State Inspector of Plumbing. Connecting with the general office of the laboratory is an office room for the Bacteriologist, Assistant Bacteriologist and the Epidemiologist. A system of inter-communicating telephones connects all laboratory rooms with the general office. These offices are shown in photographs Nos. 7 and 8.

Special Laboratory:—Connecting directly with the office of the Bacteriologist is a small laboratory room used for research and other special work. The tables, etc., are similar to those in the diagnostic laboratory which is described later. A part of the equipment shown consists of a polariscope, dark ground illuminator, freezing microtome, a binocular and an ordinary microscope. A section of this room showing its position as regards the office is shown in photograph No. 8.

Diagnostic Laboratory:—This laboratory is shown in photograph No. 9 and is used for the routine diagnostic work in tuberculosis, diph-

theria, typhoid fever, malarial fever, rabies and miscellaneous specimens. The table supports in this room, with the exception of the microtome table, are constructed of inch gas pipe, enameled gray and the tops are composed of several "Vitrolite" slabs, $\frac{1}{2}$ inch thick and 30 inches wide. This material is pure white, non-porous and therefore, very resistant to acids, stains, etc. Other table tops in this laboratory are of plate glass. The advantage of this is obvious when working with infectious material. The staining sink and drain board are not shown in the photograph and are of white porcelain.

The equipment of this room consists mainly of five microscopes, a micro-photographic apparatus, Minot microtome, Barber isolating apparatus, 37° incubator and an opalite refrigerator. This room has three large north and two east windows giving an abundance of light for microscopical work.

Ammonia Room:—Situated between the diagnostic and general chemical laboratory is a room for any chemical work involving the use of chemicals which would interfere with the nitrogen determinations on water samples in the general chemical laboratory and for chemical work in connection with the bacteriological laboratories. All of the standardized glassware for chemical and bacteriological work is kept here. In one corner of this room is built a balance room. The latter is mostly of glass and practically dust proof. The brackets supporting the balances are specially constructed to minimize the vibration from the walls of the building and are entirely separate from the shelf for dessicators, etc. It contains two balances, one for routine work and one for use in the preparation of standard solutions, etc. This room with a view through the chemical laboratory and into the water bacteriological room is shown in photograph No. 10. There is a six-foot double hood containing drying ovens, paraffin bath, electric hot plate, etc., constructed in this room which does not show in this view. It is of the same construction as the one in the general chemical laboratory.

General Chemical Laboratory:—A view of this laboratory is shown in photograph No. 11. It will be seen that there are four large windows here which give excellent light for titrations and colorimetric work. Sanitary chemical analyses of water are made in this laboratory. Aside from the ordinary equipment of glassware, etc. the large electric hot plate, specially designed ammonia still, and the general and Kjeldahl hood may be mentioned. The hoods are not shown in this photograph but a part of the general hood is shown in view No. 15. This hood is nine and one-half feet long and the Kjeldahl hood which joins it is three and one-half feet long. They are both constructed with cupboards underneath, a heavy slate top and a galvanized iron canopy lined with asbestos paper. The Kjeldahl hood is lined with $\frac{1}{4}$ -inch asbestos board to a height of 18 inches above the slate.

Ammonia Still:—This apparatus was designed with the co-operation of the engineering department and state plumbing inspector and is such

an improvement over the old style used by this laboratory and that usually seen in public health laboratories and universities that partially detailed description is given. The distillation tubes are of $\frac{1}{2}$ -inch block tin and these are passed through a condenser made of galvanized iron pipe $1\frac{1}{4}$ inches diameter by about 20 inches long. This block tin is soldered into brass plugs at each end of the condenser. Gas and water supply pipes are carried below the condensers and supported from the table top. The burner and ring supports are adjustable on the $\frac{1}{4}$ -inch gas pipe risers which are screwed into two $\frac{3}{8}$ -inch gas pipes carried under and behind the frame work and supported by it. (Photograph No. 12.)

The principal advantages of this type are:

1—All ring stands, etc. are carried to the rear and do not interfere with removing or replacing flasks.

2—It is sectional in construction and permits the use or repairs on one still without interfering with the use of the remainder.

Water Bacteriological Laboratory:—Photograph No. 14 shows the larger part of this room which is used for bacteriological examinations of water, etc., and contains equipment for this and other bacterial work such as preparation of vaccines, serums, etc. 37° and 20° incubators and a constant temperature bath for agar tubes, are provided here as well as an extra large refrigerator for storage of culture media.

Media Room:—This room, shown in photograph No. 15 was formed by partitioning off a part of the general chemical laboratory with the large double hood. The construction of this hood can be partly seen in this view as it opens both into the media and chemical rooms. All culture media and glassware for bacteriological work are prepared here. The equipment consists of sterilizing ovens, solution scales, etc., and a suction apparatus shown in the general chemical room extends into this room also and can be used in filtering media.

Express Room:—In this room, photograph No. 13, the bottles for collecting chemical and bacteriological water samples are prepared for shipment. It also serves as a room for cleaning apparatus used in the chemical room and diagnostic laboratory and is connected with the latter by a door shown in this view. Some of the larger apparatus such as centrifuge and sputum shaker used in connection with diagnostic work are located in this space. Recently an air pressure and vacuum apparatus was installed alongside the two pieces mentioned above.

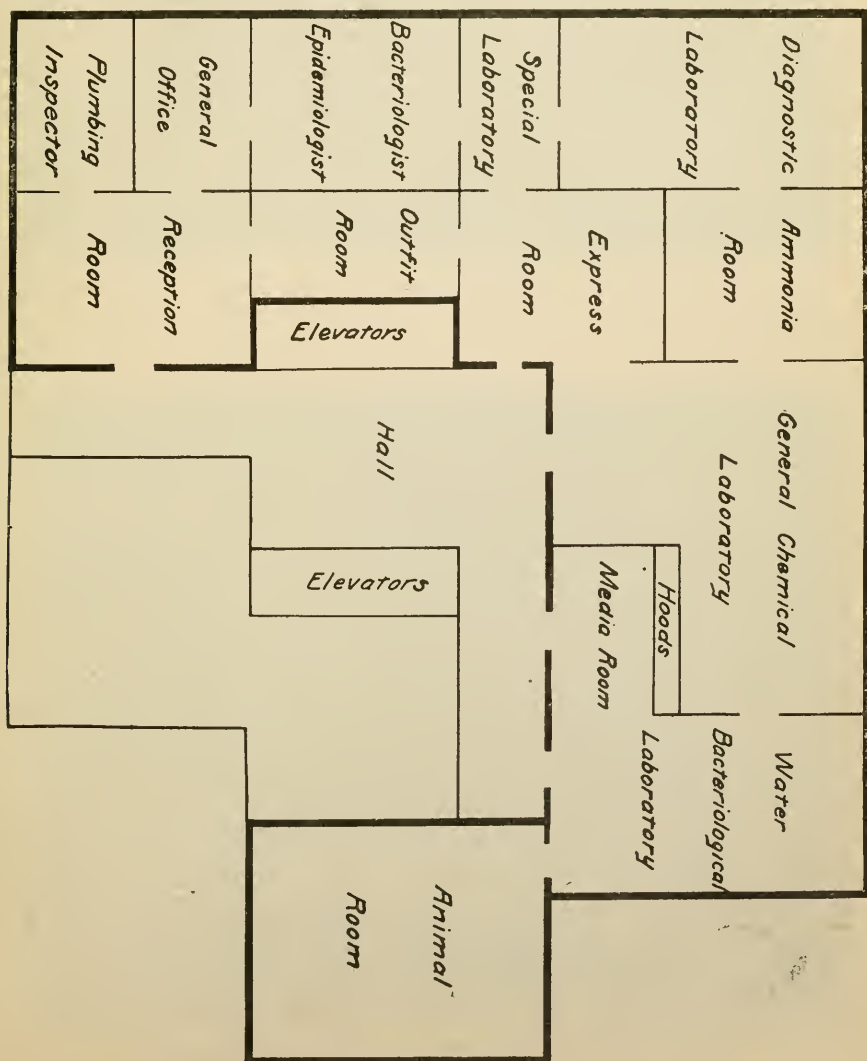
Outfit Room:—Only a small portion of this room is shown in photograph No. 13. It contains storage cases along each side and opens both into the express room and office for convenience in supplying outfits. All stock for making up tuberculosis, diphtheria, typhoid, ophthalmia neonatorum, etc., outfits are stored here and a large supply of prepared outfits kept on hand.

Animal Room:—As will be seen from photograph No. 16 this room is used principally for an animal room but it also has two commodious storage cases used in storing extra supplies of glassware, hardware, ship-

ping cases, etc. The supports for animal cages are made of 1-inch gas pipe and are easily kept free from insects, etc., common to such rooms. The large animal cages on the floor are 6 by 3 feet and rest on castors so that little trouble is encountered in cleaning and moving them.

This room also contains the water stills, autoclave and 24-inch crematory for disposing of rabies specimens, infected cotton, paper, etc. This crematory is enclosed in a room constructed of $\frac{1}{4}$ -inch asbestos board mounted in a metal frame and has two connections with the ventilating shaft. A large slop sink with foot valves is included in the equipment here for use in care of animal cages, etc.

All rabies specimens are received, the dissections made and carcasses destroyed by cremation in this room.



Fourth Floor Hartman Building — Showing layout of Laboratories.



7. Laboratories. Offices of Laboratory Clerk and State Inspector of Plumbing.



8. Laboratories. Offices and Special Laboratory.



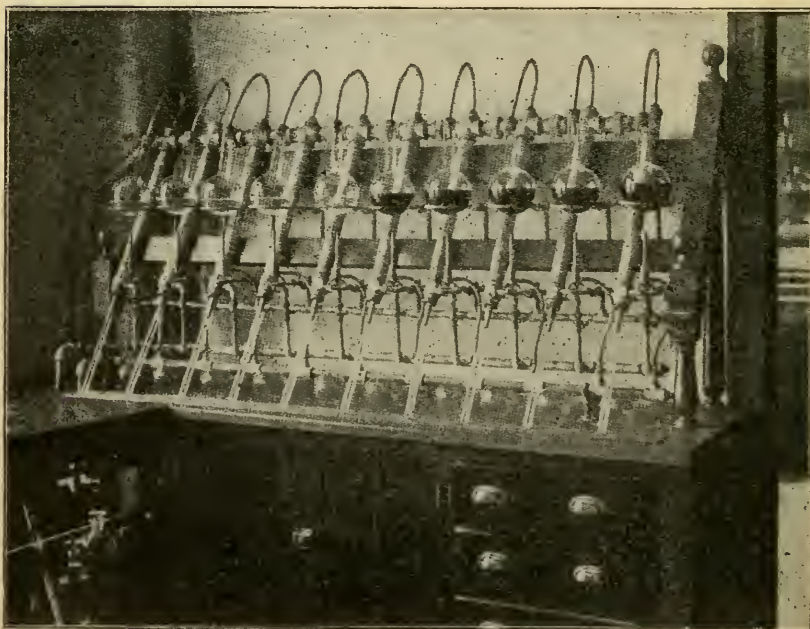
9. Laboratories. Diagnostic Laboratory.



10. Laboratories. Ammonia Room and Balance Room.



11. Laboratories. General Chemical Laboratory.



12. Laboratories. Ammonia Still.



13. Laboratories. Express and Outfit Rooms.



14. Laboratories. Water Bacteriological Laboratory.



15. Laboratories. Media Room.



16. Laboratories. Animal Room.

The total number of examinations during the year was 6,929 divided as follows:

Diphtheria	1267
Tuberculosis	2842
Widals	902
Malaria	24
Rabies	181
Water	1159
Sewage	30
Miscellaneous	524

The following table shows the number of kinds of examinations made during each month of the year 1912:

	Diphtheria.	Tuberculosis.	Widals.	Malaria.	Rabies.	Miscellaneous.	Water.		Sewage.
							Chem.	Bact.	
January	65	230	62	0	13	109	65	103	0
February	44	232	64	0	12	51	55	70	6
March	65	289	44	5	15	55	50	84	0
April	44	285	54	1	22	63	79	109	0
May	45	282	54	3	11	16	61	82	6
June	24	231	58	1	20	81	68	76	4
July	32	218	77	2	26	23	37	52	5
August	50	213	138	3	21	17	82	122	5
September	159	192	135	5	14	5	70	123	0
October	273	221	124	3	9	15	64	127	0
November	267	214	47	1	10	76	69	115	0
December	199	235	45	0	8	13	47	71	4
Totals	1,267	2,842	902	24	181	524	747*	1,134*	30

The above table shows that during the year 1912 there has been a marked increase in the number of specimens examined over any previous year. The total number of specimens examined in 1911 was 5,368. This number represents an increase of 15% on the year 1910. The examinations made for the year 1912 showed an increase of 1,529 specimens or an increase of 22% over the preceding year.

This marked increase in the number of specimens submitted to the laboratory for examination has been, doubtless, due to the fact that physicians are relying more and more on the laboratory to assist them in making their diagnoses. It is also gratifying to note that physicians are asking the laboratory to examine specimens outside of the field of ordinary routine examinations which will help them in making a diagnosis of cases where the clinical symptoms are not clear.

* The total number of chemical and bacteriological analyses does not represent individual samples, but represents the analyses of 1,159 samples on which chemical and bacteriological examinations were made.

DIPHTHERIA.

Table showing number of examinations classified:

	Positive.	Negative.	Atypical.	Unsatisfactory.	Total.
January	18	43	4	0	65
February	15	29	0	0	44
March	15	47	3	0	65
April	9	33	2	0	44
May	10	34	1	0	45
June	7	17	0	0	24
July	11	20	1	0	32
August	23	24	3	0	50
September	39	103	17	0	159
October	99	153	20	1	273
November	111	136	17	3	267
December	55	132	11	1	199
Totals	412	771	79	5	1,267

The total number of diphtheria examinations made during the year shows an increase of 637 specimens representing an increase of 49.7% over the preceding year.

A number of specimens were received in the laboratory during the year which were not examined because they were submitted in irregular containers and were in such a primitive and poor condition that no examination could be made without becoming a source of danger to members of the laboratory staff in handling them. Physicians in the State who disregard the rules of the laboratory are, however, comparatively few in number. The great majority of the physicians are willing to conform to the regulations prescribed by the Board of Health laboratories.

TUBERCULOSIS.

Table showing monthly examinations classified:

	Positive.	Negative.	Unsatisfactory.	Total.
January	65	165	0	230
February	79	153	0	232
March	83	206	0	289
April	63	222	0	285
May	79	203	0	282
June	54	177	0	231
July	67	151	0	218
August	59	154	0	213
September	57	135	0	192
October	57	163	1	221
November	45	168	1	214
December	56	179	0	235
Totals	764	2,076	2	2,842

The number of sputum examinations for the year 1912 shows an increase of 487 in the number of specimens or an increase of 17.1%. The percentage of positive examinations shows a slight decrease on the preceding year which is sufficient to indicate that physicians are sending in sputum more from incipient cases and attempting to diagnose the disease in its early stages.

WIDAL REACTIONS.

Table showing monthly examinations classified:

	Positive.	Negative.	Atypical.	Unsatisfactory.	Total.
January	32	29	1	0	62
February	22	36	6	0	64
March	10	30	4	0	44
April	15	36	3	0	54
May	15	32	7	0	54
June	23	31	4	0	58
July	30	41	6	0	77
August	57	67	14	0	138
September	34	85	16	0	135
October	36	77	11	0	124
November	9	33	5	0	47
December	8	28	8	1*	45
Totals	291	525	85	1	902

The Widal reactions for typhoid fever show an increase of 96 in the number of specimens or an increase of 10.6% on the year ending December, 1911.

* Insufficient blood making a satisfactory examination impossible.

RABIES.

Table showing monthly examinations classified:

	Positive.	Negative.	Suspicious.	Unsatisfactory.	Total.
January	4	9	0	0	13
February	8	4	0	0	12
March	10	5	0	0	15
April	9	13	0	0	22
May	8	3	0	0	11
June	12	8	0	0	20
July	9	17	0	0	26
August	8	13	0	0	21
September	4	9	0	0	14
October	5	3	1	1	9
November	5	3	0	2	10
December	4	4	0	0	8
Totals	86	91	1	3	181

The total number of specimens examined during the year was 181 which was an increase of 60 or 33% increase on the year 1911.

MALARIA.

Table showing number of monthly examinations classified:

	Positive.	Negative.	Unsatisfactory.	Total.
January	0	0	0	0
February	0	0	0	0
March	0	5	0	5
April	0	1	0	1
May	0	3	0	3
June	0	1	0	1
July	0	1	1	2
August	0	3	0	3
September	0	5	0	5
October	0	0	3	3
November	0	0	1	1
December	0	0	0	0
Totals	0	19	5	24

While there was an increase in the number of specimens in the past year, the small number of requests for malarial examinations is sufficient to indicate that physicians regard the presence of malaria in the State as of very little consequence. Its occurrence seems to be limited to the early spring and summer months. The presence of malaria seems also to be limited to the regions bordering on the Ohio River.

WATER ANALYSES. (CHEMICAL).

	Proposed.	Present.	Private.	Total.
January	8	44	13	65
February	12	24	19	55
March	5	24	21	50
April	19	51	9	79
May	15	19	27	61
June	7	37	24	68
July	2	11	24	37
August	1	40	41	82
September	0	28	42	70
October	13	35	16	64
November	16	43	10	69
December	9	27	11	47
Totals	107	383	257	747

WATER ANALYSES. (BACTERIAL).

	Proposed.	Present.	Private.	Columbus Tap.	Total.
January	8	68	20	7	103
February	12	24	23	11	70
March	5	41	21	17	84
April	20	59	10	20	109
May	16	20	27	19	82
June	7	36	24	9	76
July	2	13	23	14	52
August	0	57	44	21	122
September	0	33	64	26	123
October	13	36	59	19	127
November	16	45	43	11	115
December	5	16	35	15	71
Totals	104	448	393	189	1,134

MISCELLANEOUS BACTERIOLOGICAL SAMPLES NOT INCLUDED IN
THE ABOVE TABLES.*Examinations for the Tubercle Bacillus.*

Specimens pus from abscesses	7
Specimens pelvic fluid	2
Specimens feces	6
Specimens cerebro spinal fluid	1
Specimen bone	1
Sample of milk	1
Specimen of mucus.....	1
Total	19

Water and Milk Examinations for B. Coli and Bacterial Count.

Samples of water for count	293
Bile tubes for B. Coli examinations.....	10
Samples of water for B. Coli examinations.....	79
Field samples of water for B. Coli examination.....	30
Sample of butter	1
Samples of milk	6
Samples of ice	8
Total	427

IRREGULAR MISCELLANEOUS SPECIMENS NOT CLASSIFIED.

Specimens tissue	2
Specimen intestinal discharge	1
Specimen pus from fistula	1
Specimens cerebro spinal fluid for meningococcus....	2
Specimens feces for typhoid.....	2
Specimens feces for gonococci.....	7
Specimens blood for anthrax.....	2
Specimen for micrococcus	1
Sample of milk for odor	1
Specimen of cheese for ptomaine poisoning.....	1
Specimen pus from abscess	1
Specimen of bile.....	1
Sample of fresh ham and pork	1
Specimen of larva	1
Specimen of worms	1
Total	25

MISCELLANEOUS CHEMICAL ANALYSIS NOT HITHERTO CLASSIFIED

Urine	4
Specimen of concentrated alkali waste.....	1
Samples of bleaching powder	7
Sewage	5
Specimen of bleach liquor	1
Specimen of lime	3
Specimen of copperas	1
Specimen of alum	10
Sample of silver nitrate	1
Sample of water for chlorine	3
Total	36

SUMMARY OF THE WORK DONE IN LABORATORY FROM ITS
BEGINNING TO DATE.

Year.	Diphtheria.	Tuberculosis.	Typhoid.	Rabies.	Water.	Sewage.	Miscellaneous.	Malaria.	Total.
1899	14	1	3	0	613	0	23	0	654
1900	42	2	0	1	671	0	43	0	759
1901	68	6	1	0	493	0	41	0	609
1902	29	10	0	2	801	0	43	0	885
1903	178	10	1	5	954	0	46	0	1,194
1904	44	35	2	5	655	0	67	0	808
1905	296	814	141	9	450	0	42	0	1,752
1906	515	994	161	34	1,309	0	99	0	3,112
1907	475	1,189	169	34	1,107	0	102	0	3,076
1908	392	1,255	231	45	766	0	50	0	2,739
1909	394	1,434	659	43	1,294	0	245	0	4,069
1910	355	1,945	781	136	1,036	153	247	12	4,665
1911	630	2,355	806	121	1,086	90	265	15	5,368
1912	1,267	2,842	902	181	1,159	30	524	24	6,926
Total .....	.....	.....	.....	.....	.....	.....	.....	.....	36,619

One noticeable feature of the above table is the constant increase in the number of specimens submitted for examination. Each series of examinations show a marked increase in number of specimens each succeeding year.

The hygienic laboratory is interested in the investigation of cases of epidemic sore throat which is so extremely prevalent in many sections of the state. In this investigation we are interested in the question of determining the manner in which this disease is contracted or communicated from one individual to another. The etiological factor in epidemic sore throat is not definitely known and an effort is being made to solve this important question. The study of epidemic sore throat offers many perplexing questions, and time is necessary for its proper solution. In order to make a thorough investigation of the cause and spread of this or other diseases occurring in the state, it is absolutely necessary for members of the laboratory staff to personally visit these infected areas and to inquire into the probable causes of the spread of these diseases. It will also be necessary to prepare papers on these diseases in order to educate the people to a realization of their importance.

During the year 1912 there have been examined in this laboratory 181 dogs which were supposed to have been suffering from rabies. Of this number 86 showed the presence of Negri bodies, a fact which signifies that there were at least 86 rabid dogs in the state during the year 1912. This also means that 86 human beings were bitten during the year, and it is only fair to assume that there were at least 86 human beings during the

year who should have been given the Pasteur treatment. These figures only have reference to the examinations which were made in this laboratory, and do not include examinations which were made in other laboratories. The Pasteur treatment alone, if based upon the costs for treatment in the city of Columbus, would be approximately one hundred to one hundred and twenty-five dollars per case. This amount is exclusive of board, room and traveling expenses of the patient. Including these last items the expenses would easily amount to \$150.00 apiece which means an outlay of something like \$12,900 paid by the people of the state who reside in the rural districts and small towns. This virus can be made by the State Board of Health laboratory and administered to the people of the state exclusive of board and room, for less than one-half the sum of money which is now paid to private laboratories for the Pasteur treatment.

It is therefore recommended that the State Board of Health consider the proposition of preparing rabies virus and supply it to the people of the state free of charge. It is also recommended that the State Board of Health take the necessary measures to provide additional laboratory facilities and additional assistants so that this important work may be carried on.

During the latter part of 1912, the laboratory began the preparation of anti-typhoid vaccine. This vaccine is distributed to the physicians of the state free of charge, upon the physicians' requests.

The various members of the Laboratory staff are engaged in some problem of investigation, and it is the intention of the laboratory staff to show that the efficiency of the ordinary routine examinations can be materially improved, likewise to demonstrate the value of original work in connection with the health problems of the state.

For nineteen months beginning January 1st, 1911, Mr. Fred Berry was in charge of the hygienic laboratories and great credit is due him not only for his efforts in designing the new laboratories, but also for the efficient manner in which he carried on the work of the Laboratory. The writer took charge of the Laboratories on August 15th, 1912.

Respectfully submitted,

T. R. BROWN,
Chief of Laboratories.

To the Secretary of the Ohio State Board of Health.

Report of Division of Plumbing Inspection

(799)

REPORT OF THE STATE INSPECTOR OF PLUMBING

I have the honor to present the following report for the year ending December 31st, 1912:

Sanitary and scientific plumbing and drainage is preventive medicine, and the necessity of a minimum standard, universal state plumbing code and state inspection, becomes more pronounced as the work progresses.

During the past twenty-five years, wonderful improvements and advancement have been made in plumbing fixtures. The copper tub, wooden wash tray and sink, marble lavatory with china bowl, pan, hopper, offset and washout closet have been eliminated by enameled iron and porcelain ware of dazzling whiteness.

Sanitary plumbing fixtures are now made in such vast quantities and so great a variety of design, that it is possible to find among the offerings of the manufacturer fixtures at prices not exceeding the cost of the old-fashioned fixtures, which were barricaded behind wooden enclosures.

The sanitarian now realizes that these enclosures were collectors of dirt and dust, the breeding place of noxious germs, and oftentimes a screen for insanitary and defective plumbing.

However, an error is often made by many, who believe that by selecting plumbing fixtures of the latest and most sanitary type, they will be insured of having a well equipped sanitary plumbing system. A building may have the finest kind of plumbing fixtures, and still be very insanitary. The installation of soil, waste and vent pipes, which carry off the wastes, is just as important and one of the units that go to make up a sanitary system. Frequent stoppage in pipes and traps, cheap and defective material, faulty and careless workmanship, which will permit the foul air from sewers to discharge into a building, are not alone costly but injurious to health. Human excrement is the most productive source of disease, and must be swiftly and safely disposed of.

Foul air from sewers often contains carbonic acid gas, most dangerous to health, and is guarded against by installing plumbing systems, so that the waste will pass through the system as rapidly and with the least amount of resistance possible; trapping the plumbing fixtures and protecting the fixture trap from siphonage and back pressure by means of vent and relief pipes; insuring the entire system of an air circulation, and avoiding in a great measure the possibility of vegetable and animal matter finding lodgement in the sewer, decomposing and generating into

gases that act chemically on lead and iron, and will destroy either in time.

The waste and vent pipes of a plumbing system are placed beneath floors and in walls and partitions, usually in comparatively inaccessible places, and the water seal in most fixture traps is invisible.

It is obvious that if the construction is faulty, the public health may be endangered, and the defect by reason of its location may not be suspected; and investigation shows that the conditions which prevail in the absence of sanitary regulation usually lead to reckless competition, careless workmanship and the use of cheap and defective material.

Plumbing laws and plumbing inspection remove these dangers in providing that all soil, waste and vent pipes within a building be installed gas and water tight, as absolutely sanitary as modern science and mechanical skill can make them, and inspected and tested before they are concealed or enclosed.

The prevention of disease is intimately allied to human happiness, and causes the reduction of pauperism and immorality. It is therefore of vital importance that sanitary plumbing be demanded and enforced by state legislation.

Here the question will arise as to what effect plumbing laws and inspection have on plumbing. It is impossible to estimate their value, but outside of health considerations, which are the most important, they will save thousands of dollars now wasted in repairing defective and dishonest plumbing, both as to material and labor.

PROGRESS IN PLUMBING REGULATION.

Plumbing laws and regulations have not kept up with the progress made in plumbing fixtures.

The Seventy-eighth General Assembly saw the necessity of uniform building regulations, and appointed as a Building Code Commission the Secretary of the State Board of Health, State Fire Marshal and State Inspector of Workshops and Factories, with instructions to prepare and submit to the Seventy-ninth General Assembly a state building code.

Included in the report of the Building Code Commission to the Seventy-ninth General Assembly was Part Four, Sanitation, "a universal, minimum standard state plumbing code for all buildings", which was accepted and became effective August 15th, 1911. Those interested in sanitary plumbing were of the opinion that a much needed law had been enacted. However, the Attorney General ruled that the administrative sections of the law did not cover residences, and was therefore not applicable to this class of buildings.

Sanitary plumbing is more essential to protect the health of the people in a residence, where they eat, sleep and spend the best portion of

their lives, than in a school, theater, church or other public or semi-public building.

In order to refrain from the enforcement of two plumbing codes, a city code for residences and the State Code for all other buildings, it would have been necessary for a city council to adopt the State Code by ordinance, requiring the expenditure of a considerable sum of money in each city.

It is essential that cities should have home rule in the appointment of local inspectors and the enforcement of the law, but the state should establish a minimum law for all buildings in all cities, and make provision for inspectors to enforce the law in municipal corporations that are without and unable to maintain local inspection.

Outside of health consideration, which of course is the greatest gain, efficiency and economy are two principles involved in plumbing laws; however, a serious mistake would be to sacrifice efficiency for economy.

Standardizing the methods of construction, sizes, weights and make of materials, fittings, pipes, etc., is a move in the direction of economy, and should be followed by a research in sanitary plumbing, which would give to the people a greater degree of efficiency at the least possible cost.

The State Board of Health's duty is prevention of disease, and they should be in a position to conduct tests and research, from both an economical as well as a sanitary standpoint. A moderate sum spent judiciously on sanitary research, would mean a net return of hundreds of thousands of dollars to the people.

STATE AND LOCAL INSPECTION.

A more comprehensive idea of the volume of work confronting this department can be had from the following classification of cities having local inspection and inspectors, and those dependent upon state inspection.

CITIES HAVING LOCAL PLUMBING INSPECTION AND NUMBER OF INSPECTORS.

<i>City</i>	<i>Population 1910</i>	<i>No. of Inspectors</i>
Cleveland	560,663	8
Cincinnati	363,591	5
Columbus	181,511	4
Toledo	168,497	2
Dayton	116,577	2
Youngstown	79,066	1
Akron	69,067	1
Canton	50,217	2
*Springfield	46,921	1
Lorain	28,883	1
*Portsmouth	23,481	1
Sandusky	19,989	1
Ashtabula	18,266	1

Norwood	16,185	1
Lakewood	15,181	1
Alliance	15,083	1
Massillon	13,879	1
Cambridge	11,327	1
Warren	11,081	1
Fremont	9,939	1
Coshocton	9,603	1
Fostoria	9,597	1
East Cleveland	9,179	1
*Salem	8,943	1
*Conneaut	8,319	1
Wellsville	7,769	1
Greenville	6,237	1
St. Marys	5,732	1
Jackson	5,468	1
Orrville	3,101	1
30	1,893,352	47

Thirty cities with a combined population of 1,893,352, having forty-seven plumbing inspectors, and enforcing thirty city plumbing ordinances which vary in their requirements as to fixtures and construction, are not only confusing to architects, manufacturers, contractors and plumbers, but are a barrier to progress and economy.

A universal, minimum standard, state plumbing code that will simplify construction and standardize materials, will mean progress, economy and efficiency.

CITIES WITH A POPULATION OF MORE THAN 5,000 DEPENDENT UPON THE STATE FOR PLUMBING INSPECTION.

<i>City</i>	<i>Population 1910</i>
Hamilton	35,279
Lima	30,508
Zanesville	28,026
Newark	25,404
Steubenville	22,391
Mansfield	20,768
East Liverpool	20,387
Marion	18,232
Findlay	14,858
Elyria	14,825
Chillicothe	14,508
Piqua	13,388
Middletown	13,152
Ironton	13,147
Lancaster	13,093
Bellaire	12,946
Marietta	12,923

*Plumbing inspectors appointed recently.

Tiffin	11,894
Barberton	9,410
Delaware	9,076
Martins Ferry	9,193
Mt. Vernon	9,087
Bellefontaine	8,238
Bucyrus	8,122
New Philadelphia	8,542
Niles	8,361
Xenia	8,706
Defiance	7,327
Galion	7,214
Kenton	7,185
Norwalk	7,858
Urbana	7,739
Van Wert	7,157
Washington C. H.	7,277
Ashland	6,795
Canal Dover	6,621
Circleville	6,744
Nelsonville	6,082
Sidney	6,607
Troy	6,122
Wellston	6,875
Wooster	6,136
Athens	5,463
Bellevue	5,209
Bowling Green	5,222
Delphos	5,038
Gallipolis	5,560
Madisonville	5,193
Newburg	5,813
Painesville	5,501
Ravenna	5,310
St. Bernard	5,002
Wapakoneta	5,349

53

576,803

Fifty-three municipal corporations with a population of more than 5,000 and a combined population of 576,803, together with 698 municipal corporations with a population of less than 5,000, and a combined population of 2,296,966, or 751 municipal corporations with a combined population of 2,873,769, or 60% of the population of Ohio, covering 41,060 square miles, are dependent upon the State Inspector of Plumbing for plumbing inspection.

In addition to administering the provisions of Part Four, Ohio State Building Code, which makes it the duty of the State Board of Health to make at least two (the first or water, and the final or smoke) inspections and tests of the plumbing and drainage of every public or semi-public building in 751 municipal corporations that are without local inspection, the present law requires that the State Inspector of Plumbing inspect any and all private institutions, sanitariums, hospitals, schools, prisons, fac-

tries, workshops or places where men, women or children are or might be employed.

The reports of conditions which existed in many of our state and county institutions (mentioned in 1911 report), warrant the inspection of the remaining at the earliest possible date.

It is obvious that the beneficial effects of this law will depend upon its proper enforcement, and that it is a physical impossibility for the State Inspector of Plumbing to make these inspections, take care of the correspondence in the office and examine and approve plans, unless provision is made for additional inspectors.

CONFERENCE OF STATE INSPECTOR OF PLUMBING WITH MUNICIPAL INSPECTORS OF PLUMBING OF OHIO.

The first conference of municipal plumbing inspectors was held in Columbus April 30th, 1912, for the purpose of reviewing the Ohio Plumbing Laws, and was attended by:

Wm. C. Groeniger, State Inspector of Plumbing.....	Columbus
D. D. Lewis, Chief Inspector of Plumbing.....	Columbus
C. H. Werline, Asst. Inspector of Plumbing.....	Columbus
A. Seddon, Asst. Inspector of Plumbing.....	Columbus
August Schelb, Chief Inspector of Plumbing.....	Sandusky
W. F. Nye, Chief Inspector of Plumbing.....	Akron
E. L. Coffman, Chief Inspector of Plumbing.....	Canton
H. R. Burke, Chief Inspector of Plumbing.....	Ashtabula
W. R. Cook, Chief Inspector of Plumbing.....	Orrville
J. J. O'Neil, Chief Inspector of Plumbing	Cleveland
Joseph McMahon, Chief Inspector of Buildings.....	Toledo
Wm. J. Yackley, Chief Inspector of Plumbing.....	Dayton

Wm. C. Groeniger, State Inspector of Plumbing, called the conference to order and briefly outlined the objects of the meeting, as follows:

Inasmuch as municipalities having local plumbing inspection are given home rule, and it becomes the duty of local plumbing inspectors, as employes of building or health departments, to administer the State Plumbing Laws in their respective cities, it is very essential that the inspectors review the provisions of the State Code, and a more general understanding be reached as to its many requirements; also that each inspector be given an opportunity to voice his experience, which will bring out the objectionable features, in order that the same could be amended and brought to the attention of the State Building Code Commission and the next legislature.

He stated that the object of the State Plumbing Laws was to create "a minimum standard, universal, state plumbing law for all buildings." By this plan it would eliminate the necessity of municipalities advertising

a plumbing ordinance adopted by a city council, and would mean the saving of a considerable sum of money in each instance.

He stated that it was his opinion that the State Board of Health should be provided with an appropriation to conduct tests and researches, in order that the best methods of construction could be worked out in the interests of health, efficiency and economy.

Mr. Groeniger then called attention to the following opinions which had been rendered by the Attorney General:

COLUMBUS, OHIO, October 4, 1911.

OPINION.

Section 4227, General Code, provides for publication of ordinances as follows:

"Ordinances, resolutions and by-laws shall be authenticated by the signature of the presiding officer and clerk of the council. Ordinances of a general nature, or providing for improvements, shall be published as hereinafter provided for before going into operation. No ordinance shall take effect until the expiration of ten days after the first publication of said notice. As soon as a by-law, resolution or ordinance is passed and signed, it shall be recorded by the clerk in a book to be furnished by the council for the purpose."

All ordinances coming within the provisions of the above section should be published in full. An ordinance adopting a plumbing code is one of general nature, and requires publication.

The State Plumbing Code is effective throughout the state, and requires no action of council. Council may make additions thereto not in conflict with any of the provisions of the State Plumbing Code.

The acts of the legislature are effective without publication. The additions which council makes to the State Plumbing Code must be published, and the statutory provisions need not be published.

Yours very truly,

TIMOTHY HOGAN,
Attorney General.

COLUMBUS, OHIO, September 11, 1911.

OPINION.

Do the words "proper state and municipal authorities" mentioned in section one, "for examination and approval", in section five, mean that such approval must be concurred in by both, or that each in their separate jurisdictions may give such approval?

That portion of section five about which you inquire affords an exception in the character of a fixture, device or construction to the fixture, device or construction provided for in the state building code. It is eminently proper that before such exception would be allowed that it be passed upon by those whose business and duty it is to be convinced that the fixture, device or construction would be amply sufficient for the purposes required, and since the legislature saw fit to join together the state and municipal authorities, I can see no reason for reading the phrases in any other manner than literally. The provision is that the plans, specifications and details shall be furnished "to the proper state and municipal authorities for approval." Had it been intended to have such plans, specifications and details furnished to either the one or the other of the aforesaid authorities, it would have been very easy for the legislature to so

provide. The language should be read in its ordinary sense and meaning, and in my opinion the approval mentioned in section 5 must be concurred in by both the state and municipal authorities before the use of another fixture, device or construction at variance with what is described in the statute would be permitted.

Very truly yours,

TIMOTHY HOGAN,
Attorney General.

Mr. Groeniger was chosen chairman and Mr. Wm. J. Yackley secretary of the conference. By unanimous consent it was agreed to go over the State Plumbing Laws and discuss each section.

WASTE PIPE.

Considerable discussion arose upon the table of waste lines in Title 1, and those in attendance agreed that this table could be changed to the following sizes:

<i>Size of Pipe</i>	<i>Branch</i>	<i>Main</i>
1¼"	1	1
1½"	2	3
2"	4	8
2½"	5	10
3"	10	18
Sizes 4-5-6-7 and 8 to remain the same.		

VENTS.

The next discussion of importance was upon the size of vents and the table in Title 1, Section 3. The question of permitting 1¼" waste and prohibiting 1¼ vent was discussed at length. Arguments were given in favor of and against the use of 1¼, and the consensus of opinion was that 1¼" could be used on short lines, but that it would not be good practice to use the same where it was necessary to use many elbows, which would cause considerable frictional resistance.

DRAIN TILE WITH HUBB AND SOCKET.

It was unanimously agreed that earthenware pipe used for tile drains could be of hubb and socket, as this was an improvement over that made without hubb or socket.

WROUGHT IRON PIPE VS. MILD STEEL.

The chairman explained that the state code called for the use of "wrought iron" pipe, but that it was not the intention of the law to prohibit the use of "mild steel": that it was impossible for the inspectors to detect the difference between mild or soft steel and wrought iron, and by actual tests it was found that the life of steel was equal to that of wrought iron.

Discussion brought out the fact that the greatest objection to the use of steel by the plumber was in the cutting and threading of hard steel pipe; that it ruined cutters and dies, and this same fault could be found with wrought iron.

METAL OR GROUND JOINTS ON THE SEWER SIDE OF THE FIXTURE TRAP.

The discussion on this question brought out the following:

Traps with washer joints in the seal were permitted.

A brass waste and vent fitting or wall T with metal ground joint or union, with either a screw, wiped or calked joint for the vent connection was permissible, providing this fitting was made in conformity with Title 2, Section 5.

REVENTS FROM CLOSET BENDS.

Considerable time was given to the discussion and interpretation of Title 9, Sections 11 and 14. It was agreed that it would be better practice when a vent was taken from the top of the horizontal portion of a bend, to permit a gradual fall in the horizontal run, than to require it to rise 6 inches vertically before being offset horizontally, in which event this portion of the vent would be flat and without grade. The law requires that this vent when taken off the horizontal line must rise 6 inches before being run horizontally.

PROHIBITED FITTINGS.

The state code prohibits the use of the double Y on horizontal waste or soil lines, and it was suggested that this fitting could be made with a slight pitch in both branches to avoid a bad joint in either branch. The majority were of the opinion that the double Y should be permitted on a horizontal line, and that by giving one branch a slight pitch it did not trap the other to any great extent; also that it was customary in practice to place both branches on a level.

CLEANOUTS—TRAP SCREWS.

It was unanimously agreed that cleanouts with brass cap, plug or screw were permissible, as long as they conformed with the sizes of openings. Trap screws must be the same size as that of the drum of the trap, irrespective of the size of the inlet or outlet.

FULL SIZE HOUSE DRAIN THROUGH ROOF.

Should the house drain be continued full size through the roof, and did the state code clearly cover this matter, was the next discussion.

While the state code does not clearly cover the matter, it does require that any horizontal line running more than 25 feet, or any vertical line rising more than 10 feet, shall be continued full size through the roof, or may be returned full size to the main stack 3 feet above the

highest fixture opening. It was the opinion of many that the main house drain should be carried full size through the roof, and that each building should be required to assist in ventilating the main sewer. This was essential, owing to the fact that the house trap is prohibited by the state law. It was agreed that this was a question of vital importance, which should be given careful consideration.

INCREASING OF SOIL PIPE STACKS.

The severe winter demonstrated the necessity of increasing the soil pipe stacks before passing through the roof. Instances were cited in Sandusky, Columbus, Toledo and Cleveland in which the 4-inch soil pipe stacks were frozen at the roof, causing the loss of trap seals. Dayton and Sandusky require the stacks to be increased. The state law does not make it compulsory to increase the stack that is 4 inches or over.

REFRIGERATOR WASTE—BAR DRAINS—SODA FOUNTAINS.

There was considerable variance as to the interpretations of this section and its intent. Title 10, Section 1 requires that all waste pipes shall be continued full size through the roof. The intent of the law is that all waste pipes carried up two or more floors should be continued through the roof, but the law does not say so. It was argued that the waste from the soda water fountain and bar fixture was very foul and should connect directly to the sewer, and not empty into an open sink or floor drain. No conclusion could be reached as to the proper, safest and most economical method of connecting these fixtures, and the matter was held in abeyance for further consideration.

SEWER SERVICES.

The State Law, Title 6, Section 1 provides:

SEWER SERVICES.

The State Law, Title 6, Section 1 provides:

The drainage and plumbing system of each new building or work installed in an existing building shall be entirely separate and independent of that of any other building, except as provided in section 2; and wherever available, every building shall have an independent connection with a public or private sewer.

Title 6, Section 2 provides:

Where one building stands in the rear of another on an interior lot, and no private sewer is available, or can be made for the rear building, through an adjoining alley, court, yard or driveway, the house drain from the front building may be extended to the rear building and the whole will be considered as one house drain.

This discussion brought out the fact that where one sewer had been permitted for more than one building, and the property was afterward

divided and sold separately, it often involved the owners in a legal complication when the sewer became clogged, as to the responsibility of placing the blame for the stoppage. By installing the independent sewer service this trouble is avoided.

Those present also disapproved of the practice of connecting two house drains to one house sewer, when the buildings were only a short distance apart, for the same reason as stated in the foregoing. It was suggested, however, that two services be permitted in one trench, laid side by side, with separate branches into the main or street sewer.

CIRCUIT AND LOOP VENT.

The chairman submitted drawings of the various systems of the circuit and loop vent which had been submitted to Prof. White, of the University of Illinois; also a blue print of Prof. White's contemplated tests of these various systems. It was the opinion of many that these tests would prove to what extent the circuit and loop vent system could be used in safety.

RECOMMENDATIONS.

The chairman requested that each inspector make notes of the different contentions and conditions that came to their attention in administering the law; also that each keep a memorandum of complaints or suggestions that might come to his notice relating to the State Plumbing Law, and that another conference be held in November or December, 1912, at which meeting these questions could be given attention, and the necessary changes be presented to the Building Code Commission.

Many important questions could not be considered, owing to the lack of time and the necessity of those present returning to their respective cities. Each was impressed with the value of the conference to himself and his city, and all were of the opinion that future conferences would be of great value to the plumbing inspectors of the state.

Cincinnati, Norwood, Alliance and Youngstown were not represented, owing to the fact that these cities could not see their way clear to providing the inspectors with funds. The benefits derived from a conference of this kind are sure to prove valuable to a city, and expenses for travel and hotel should be allowed their delegates.

The conference adjourned at 5:30 P. M., to meet again during the months of November or December, at the call of the chairman.

PROPOSALS FOR CHANGE IN PART FOUR—SANITATION, OHIO STATE BUILDING CODE.

During the year, there were many requests to the State Board of Health to change the express provisions of the code, by allowing more fixtures to be added to a given size waste pipe; to permit a lesser grade

of brass pipe; to permit a device that is prohibited; to change the wording of a section, and to permit a smaller size than is provided by law.

By order of the Board, the entire matter was referred to the Attorney General, whose opinion is as follows:

OPINION.

COLUMBUS, OHIO, December 7, 1912.

State Board of Health,
Columbus, Ohio,

Gentlemen:—

I beg to acknowledge receipt of your letter of recent date, in which you state:

"The State Board of Health desires to know,

1. To what extent, if any, the board has authority to allow the substitution, for a device, fixture or construction, specified in Part Four of the Ohio State Building Code, being sections 12600-137 to 12600-238, of some other device, fixture or construction, that test or experience has shown to be equal in efficiency to that specified.

2. How limited or how broad are the powers of the Board in the definition of what is comprised in the words 'device', 'fixture' and 'construction'?" In reply to your first inquiry I desire to say that Section 12600-277 provides: "** * * * Where the use of another fixture, device or construction is desired, at variance with what is described in this statute, plans, specifications and details shall be furnished to the proper state and municipal authorities mentioned in Section 1, for examination and approval, and if required, actual tests shall be made, to the complete satisfaction of said state and municipal authorities that the fixture, device or construction proposed answers, to all intents and purposes, the fixture, device or construction, hereafter described in this statute, instead of actual tests satisfactory evidence of such tests may be presented for approval with full particulars of the results, and containing the names of witnesses of said tests.*"

It is a rule of construction, well known to the law, that a statute must be construed with reference to the whole system of which it forms a part. It was evidently the intention of the legislature, in enacting the section above quoted, to vest a discretionary power in the officers designated in Section 1 of the building code, whose duty it is to enforce the provisions of Part Four of said code, namely: the state board of health or building inspector or commissioner, or health departments of municipalities having building or health departments, *when acting in conjunction*, to approve some proposed device, fixture or construction, which they may find answers to all intents and purposes the fixture, device or construction, specified in said building code, under said Part Four. In my opinion, said Section 12600-277 is directory as to the powers of said officers, heretofore enumerated, as to the approval of the proposed substitution therein specified. The statute itself vests a certain power or jurisdiction in the state board of health and the municipal officer to approve and grant the right to the use of some other device, fixture or construction, found by them to answer, to all intents and purposes, the fixture, device or construction specified in said code.

There can be no doubt as to the right of the legislature to vest said public officers or boards with such power, and the only remaining problem in your first question is as to what extent, if any, the board can go in exercising this power.

As the act makes the power discretionary, it is my opinion that so long as the respective officers *acting in conjunction* upon any proposed substitution, are satisfied that the same will answer, to all intents and purposes, for those devices, fixtures and constructions specified in the statute, they may grant the permission to substitute.

I am further of the opinion that the power of said board and municipal officer, specified in Section 1, to allow a substitute, extends not only to the kind or class of fixture, device or construction, but to the substance constituting the same or the method in which it is placed. In other words, the power extends to the allowance of a substitute for any of the enumerated devices, fixtures or constructions, as to material and workmanship.

As to your second question, namely:

"How limited or how broad are the powers of the Board in the definition of what is comprised in the words, device, fixture and construction?"

I desire to say as to the first, namely, the device; that it would mean not only the manner in which it is devised or formed by design, but the substance of which the same was manufactured or constructed: as to the second, namely, fixture; the power would extend to the designation of the kind of fixture that should be substituted in the place of that specified in the statute, not only as to the material, but as to the method of its being attached or made a permanent appendage to the whole system of plumbing which is to be used; and as to the third, towit, construction: it is my opinion that the meaning to be given it is the manner of putting together the parts of the sanitary plumbing system to be installed, as provided in said code, so as to give the whole its peculiar form.

In conclusion, it is my opinion that the powers of the Board, *when acting in conjunction* with the municipal authorities specified in said Section 1 of said building code, are broad in their nature, and must be given that liberal construction which will give the greatest effect possible to the code in general as a whole. But at the same time, the power should not be exercised, even with the discretion vested by said statute, unless said substitute meets, as to all intents and purposes, the fixture, device or construction specified in the code, and particularly that part hereinbefore specified, namely: Part four, relating to the construction, installation and inspection of plumbing and drainage.

Yours very truly,

(Signed) TIMOTHY L. HOGAN,
Attorney General.

TESTS OF PLUMBING APPARATUS.

February 8th-11th, was spent visiting the University of Illinois, to witness laboratory equipment and tests made under the direction of Prof. White, and while there met Messrs. Ed. Quinn, E. H. Donahue and Thos. Claffy, the Board of Directors of the American Society of Inspectors of Plumbing and Sanitary Engineers.

Prof. White had erected a 4-inch test stack about 65 feet high, with fittings for openings at the various floor levels. The top floor had an extended branch with openings for 4 water closets. A 1½ inch water supply on the top floor under 20 lbs. pressure supplied the water for testing. Crosses with glass windows and a glass pipe were provided in the hori-

zontal and vertical lines close to the base of the stack, which permitted observation of the action of the water. There was a great deal of agitation of the water in the horizontal line when the relief vent was closed, showing a considerable amount of compressed air. The flushing of the stack with about 20 gallons of water, and with all of the openings at the top wide open, as would be the case under ordinary conditions in a building, showed a difference of $2\frac{1}{2}$ inches in the water level or seal of a glass trap placed at the end of a 20-foot branch line. This indicated a vacuum caused by the discharge of fixtures above.

By connecting the glass trap to a fitting close to the stack on the same floor level, a difference of 7 inches in the water seal or level was shown, denoting a stronger vacuum when placed closer to the stack.

Tests were made for air currents with an anemometer, showing a speed of 450 feet per minute compressed air coming out of the 2-inch relief vent opening at the base of the stack, and showing approximately the same amount of air being drawn into the stack at the top. Tests with the same instrument near the middle of the stack showed a speed of 20 feet per minute being drawn into the stack, indicating that a point of equilibrium had almost been reached.

The question of the circuit and loop vent and the plans submitted by this department were discussed, and it was the opinion of the Board that this system should be given a thorough test to prove its efficiency.

In answer to an inquiry as to what progress was being made, I was informed that the University of Illinois expected to finish a part of the tests proposed by this department in March, 1913.

INSPECTIONS OF OLD BUILDINGS.

OHIO SCHOOL FOR THE BLIND.

This institution is located at Main Street and Parsons Avenue, Columbus, Ohio.

The plumbing consists of 47 water closets; 5 slop sinks; 14 plain sinks; 1 urinal; 3 urinal troughs; 12 floor drains; 81 wash basins; 21 bath tubs; 10 shower baths; 4 drinking fountains; 2 laundry trays, making a total of 200 plumbing fixtures distributed over various parts of the building.

The house drain consists of stone pipe, and the sewage discharges into the city sewer on Main street.

Existing conditions.

The sanitary condition of the plumbing in general is fair.

The toilet room floors, walls and fixtures are kept neat and clean.

Fourteen out of twenty-one water closets on three floors on the boy's side are not in use. A number of these are clogged, and on others the

flushometer valves are out of order. Upon inquiry, it was learned that these closets were a continual source of trouble to the authorities.

The traps receiving waste from the lavatories on the second and third floors of boys' general toilet rooms are placed beneath the floor, permitting many feet of fouling area from these fixtures.

In room 13 C the vent from the lavatory has been disconnected, permitting sewer air to discharge into this room. The soil pipe hanger has been removed from the pipe at the ceiling.

The waste pipe from the slop sink in the closet on the second floor, boys' department, has been carried to the cellar and then trapped. The connection to this trap has not been made tight, which allows sewage to discharge into the cellar.

The floor drain on the boys' side, first floor, recently connected to the sewer with a 3-inch iron pipe, is supported with wooden blocks and wire. A wooden plug and putty joints is used in place of a cleanout.

Vents from the bath tub and wash stand traps have been removed on the second floor, front bath room, girls' dormitory.

The following fixture traps are not protected from siphonage: the sink in housekeeper's room; lavatory in printing shop; laundry tray in girls' laundry; kitchen sink in girls' laundry; lavatory in store room; bath tub and lavatory in female employes' bath room; 3 sinks in main kitchen.

Both general ice boxes are connected directly to the sewer.

The connection of the closet bowls in the toilet rooms on third and fourth floors, girls' dormitory, are defective, permitting these bowls to move about.

The work recently installed in the girls' dormitory wash room is very poor. A two-inch waste pipe stack is carried up to the second floor, increased to three inch, carried up to the fourth floor, and receives the discharge of ten lavatories. This waste pipe stack is not carried through the roof for ventilating purposes.

The plumbing in the general kitchen, employes' bath and toilet room, in the center wing of this building, is in very bad condition.

Recommendations.

That the flushometer valve in the toilet room in the boys' dormitory be repaired or replaced with a guaranteed valve or tank.

Reconnect the vent pipe to the lavatory trap and replace pipe hanger in room 13C.

Provide trap for slop sink in boys' department, second floor, as close to the fixture as possible, and vent same. Remove trap in cellar and make proper connections.

Install cleanout plug in 3-inch floor drain waste in place of wooden plug, and properly support waste pipe.

Discontinue the practice of removing vent pipes and not replacing them. This is often done in replacing traps, and is very bad practice.

The method of installing plumbing fixtures and not protecting the traps from siphonage or back pressure, and where the discharge of one fixture will unseal the trap of another fixture, permitting sewer air to discharge into the building, is very bad practice.

This condition exists in many instances mentioned above, and should by all means be corrected.

Disconnect waste pipes from the general ice boxes, and discharge these wastes into an open sink or floor drain, thereby protecting these ice boxes from sewer air.

Reset water closet bowls in girls' toilet rooms.

Replace two-inch waste pipe stack in the east end of girls' dormitory with three-inch.

Install slop sinks on each floor, and connect the ten lavatories recently installed to this stack.

Place the plumbing in the general kitchen and employes' bath and toilet rooms in sanitary condition.

The State Board of Health approved the foregoing recommendations. The authorities in charge were notified, the recommendations have been complied with and the construction inspected by the State Inspector of Plumbing.

The excavation of pipe tunnel in this building for the purpose of systematically arranging the steam and water mains, brought to light many defects in the tile sewer. After a careful inspection by the superintendent, with the mechanical engineer of the Board of Administration and the State Inspector of Plumbing, it was agreed to recommend the replacing of this sewer with extra heavy cast iron.

This recommendation was approved by the Board of Administration, and the tile house drain in the north wing of the building has been replaced by extra heavy iron with the proper cleanouts.

ICE CREAM*PARLOR AND CONFECTIONERY.

This ice cream parlor and confectionery is located in the Judy building on South Main street, Washington C. H., Fayette County, and owned by Peter Brown.

The plumbing consists of one floor drain; 1 wash basin; 2 pantry sinks; making a total of 4 plumbing fixtures.

The house sewer consists of iron pipe, and the sewage discharges into a private sewer which empties into Paint Creek.

Existing Conditions.

This ice cream parlor and confectionery, where the ice cream and candy are made in the cellar, is in a very insanitary condition. The cellar contains 6 open sewer connections.

The wastes from the soda fountain are connected with rubber hose, which is inserted into an opening in the soil pipe.

The sewer is above the bottom of the cellar, and the water is pumped into the soil pipe through a funnel.

None of the fixture openings are trapped.

Recommendations.

That the proprietor place this ice cream parlor and candy factory in good sanitary condition, by placing a sink properly trapped in the cellar, and discharging the wastes from the ice box and soda fountain into the same.

Remove defective plumbing and plug sewer openings.

The State Board of Health approved the foregoing recommendations. Mr. Brown was notified, the changes have been made and work inspected.

During the year, recommendations were made for the betterment of the sanitary conditions in forty-five buildings throughout the state, which were readily complied with.

INSPECTIONS OF NEW BUILDINGS.

STATE BUILDINGS INSPECTED.

State Serum Farm	Reynoldsburg
Miami University — N. Dormitory	Oxford
Miami University — S. Dormitory	Oxford
Miami University — Hepburn Hall	Oxford
Miami University — Woman's Bldg.	Oxford
State Normal School — Dormitory	Kent
State Normal School — Adm. Bldg.....	Kent
Armory	Paulding
Lima State Hospital	Lima

LIMA STATE HOSPITAL.

This institution is in the course of erection, is located $2\frac{1}{2}$ miles north of Lima, and its magnitude can only be appreciated after a personal visit to the buildings.

The following buildings lead from the main corridor, which circles an oval shaped court one-quarter of a mile in circumference: isolation pavilion, pavilion No. 5, corridor No. 4, pavilion No. 3, corridor No. 2, pavilion No. 1, infirmary A, assembly hall, infirmary B, pavilion No. 10, corridor No. 9, pavilion No. 8, corridor No. 7, pavilion No. 6, woman's pavilion and mess hall. The domestic group of buildings is immediately

north of the mess hall, and the developed length of the foundation walls is approximately a mile. The power house is located 433 feet north, and is connected to the domestic group by a concrete tunnel.

The plumbing when completed will consist of 155 water closets, 12 bath tubs, 199 wash basins, 16 sinks, 61 urinals, 41 slop sinks, 81 shower baths, 42 cellar floor drains and 38 drinking fountains, a total of 645 plumbing fixtures. The sewage will discharge into a sewage disposal plant.

The main sewer, starting from the sewage disposal plant, is run east of the domestic group and mess hall, beneath the corridor and through the entire length of the court, passing out of the southern end of the court east of the assembly hall, serving each of the above named buildings with branches. With the exception of where the main sewer passes beneath the north and south ends of the corridor, and the 12 inch sewer running the full length of the north end of the domestic group, the entire house drain to within three feet outside the foundation walls is of extra heavy cast iron pipe. The vitrified tile sewers were encased in concrete, and tested with a ten foot head of water.

CLEANOUTS.

Cleanouts are provided on each branch, immediately inside the foundation walls, set flush with the cement floor, and additional cleanouts have been provided at intermediate points on long runs, at changes of direction and at the foot of all soil pipe lines, making the entire sewerage system accessible in the event of stoppage. Y's and $\frac{1}{8}$ bends forming easy turns have been installed at the changes in direction.

MATERIAL USED IN INSTALLATION.

**Extra Heavy Soil Pipe, Fittings and Cleanouts used in the Construction.*

2550 feet of 6" extra heavy soil pipe
 985 feet of 5" extra heavy soil pipe
 985 feet of 4" extra heavy soil pipe
 100 feet of 3" extra heavy soil pipe

4620 feet of extra heavy soil pipe
 352 — 6" extra heavy fittings
 196 — 5" extra heavy fittings.
 160 — 4" extra heavy fittings
 17 — 3" extra heavy fittings

725 extra heavy soil pipe fittings
 50 — 6" cleanouts
 22 — 5" cleanouts
 56 — 4" cleanouts

128 cleanouts

INSTALLATION. -

Owing to the fact that the sanitary sewer had to be installed at a depth lower than the storm sewer (already installed), it became necessary for the contractor to pump the water from the trenches, and to devise some way of having these lines tested.

The soil is of a character that crumbles when moist, and as hundreds of feet of pipe had to be laid in trenches running parallel with the foundation walls, which in many instances were lower than the foundation footings, it was evident that it would be dangerous to permit these trenches to remain open for any length of time.

At a conference between the architects' superintendent, contractor's superintendent, plumbing contractor and state inspector of plumbing, it was agreed that every precaution must be taken to avoid the settling, undermining and possible destruction of the foundation walls.

As it was impossible for the state inspector to remain in constant attendance, it was agreed that as each line was installed it should be inspected, and as soon as the plumbing contractor had tested the line out, the trench was to be filled and a 5 pound air test made in the presence of the inspector upon his return to inspect additional lines.

This made it necessary for the state inspector of plumbing to visit the institution on ten occasions, make twelve inspections and nineteen separate tests, as follows:

<i>Date of visit</i>	<i>Inspected construction</i>	<i>Accepted tests</i>
Aug. 2	Isolation pavilion	
	Pavilion No. 5	
Aug. 22	Pavilion No. 1	Isolation pavilion Pavilion No. 5
Sept. 5	Corridor No. 2	Pavilion No. 1
	Corridor No. 4	Pavilion No. 3
	Infirmary A (in part)	
Sept. 13	Infirmary A (in full)	Corridor No. 2 Corridor No. 4
Sept. 19	Infirmary B	Infirmary A
Sept. 26	.....	Infirmary B (in part)
Oct. 9	Domestic group (in part)	
Oct. 18	Corridor No. 7	Corridor No. 9
	Pavilion No. 6	Pavilion No. 8
	Domestic Group (north end)	Pavilion No. 10
		Domestic group (in part)
Nov. 1	.....	Woman's pavilion Pavilion No. 6 Corridor No. 7 Infirmary B (entire) Kitchen Refrigerator room
Nov. 22	.....	Domestic group (entire)

COUNTY BUILDINGS.

Clark County Children's Home.....	Springfield
Champaign County Children's Home.....	Urbana
Defiance County Court House.....	Defiance
Montgomery County Infirmary.....	Dayton
Mercer County Infirmary.....	Celina
Fulton County Infirmary.....	Ottokee

The above inspections were on new work, and the installations in accordance with Part Four, Ohio State Building Code.

FOLLOWING ARE THE COLLECTIONS MADE BY THIS DEPARTMENT DURING THE YEAR 1912, INCLUDING THE DATE, AMOUNT, RECEIPT NUMBER, PAYEE, THE BUILDING AND ITS LOCATION.

Date.	Amount.	Receipt No.	Paid by	Address.	For Building Located at
Jan. 2	\$5 00	5	Frazer & Spence.....	Steubenville, Ohio	St. Peter's School, Steubenville, Ohio.
Mar. 22	5 00	6	Terry McIntire.....	Market Street, Lima, Ohio.....	Lima House, Lima, Ohio.
Mar. 25	5 00	7	Morgan & Wood.....	135 W. Spring, Lima, Ohio.....	Store and flats, S. Elizabeth Street.
Apr. 2	5 00	8	A. J. Frecka.....	28 S. 3rd Street, Ironton, Ohio.....	Lodge building, 2nd St. and Railroad.
Apr. 3	5 00	9	Delphos Hardware Co.	Delphos, Ohio	Carnegie Library, center of Park.
Apr. 4	5 00	10	Baxter & Brown.....	Tiffin, Ohio	Heidelberg University, Greenfield Street.
Apr. 4	5 00	11	A. V. Noffsinger.....	Defiance, Ohio	Court House, Defiance, Ohio.
Apr. 22	5 00	12	Theo. G. Scheid.....	Lima Ohio, 401 Opera House.....	Cor. Elizabeth and Grand, Lima, Ohio.
May 4	5 00	13	The Eagan Bros. Co....	237 Erie Street, Toledo, Ohio.....	Country Club, Toledo, Ohio.
May 9	5 00	14	Groenewald & Lang....	18 St. Clair Street, Toledo, Ohio.....	Inverness Club, Toledo, Ohio.
May 3	5 00	15	Bohn & Kern.....	36 S. 3rd Street, Zanesville, Ohio.....	Weller Building, S. 5th Street.
May 6	5 00	16	Morgan & Wood.....	135 W. Spring, Lima, Ohio.....	44 N. Main Street, Lima, Ohio.
May 17	5 00	17	D. W. Schneider.....	Washington C. H., Ohio.....	Judy Building, S. Main Street.
May 22	5 00	18	Lima Plbg. & Heat. Co..	125 E. Spring Street, Lima, Ohio.....	Garage, 36½ E. Market Street.
May 22	5 00	19	Lima Plbg. & Heat. Co..	125 E. Spring Street, Lima, Ohio.....	Bottling Works, 116 Water Street.
May 22	5 00	20	North Lima Plbg. Co..	Lima, Ohio, 401 Opera House.....	Metropolitan Block, cor North and Main.
May 23	5 00	21	Theo. G. Scheid.....	Lima, Ohio	Allen Hotel, Public Square.
May 28	5 00	22	Cran-Stuart Co.	Springfield, Ohio	Kenton Street, opposite Oak.
May 28	5 00	23	John Marquardt	Clyde, Ohio	People's Bank, Main and Buckeye.
May 28	5 00	24	The Hoffman-Conklin Co.	669 N. High Street, Columbus, Ohio..	School House, Grandview, Ohio.
June 3	5 00	25	Conn. F. Ducey.....	Washington C. H., Ohio.....	Midland Grocery, S. Main Street.
June 4	5 00	27	Samuel W. Shoarer....	138 Jackson Street, Zanesville, Ohio..	Ten Cent Store, 511 E. Main Street.
June 8	5 00	26	Chas. E. Ridenour & Co.	35-37 W. High, Springfield, Ohio.....	Saloon, 23 S. Market Place.
June 13	5 00	28	The T. B. Johns Co....	211 S. Main Street, Lima, Ohio.....	Grocery and flats, N. Elizabeth Street.
June 15	5 00	29	James Krumboltz	1118 S. Yellow Springs Street.....	City Hospital, Clifton & York, Springfield, O.
June 17	5 00	30	Delphos Hardware Co..	Delphos, Ohio	Saloon, corner Main and 2nd.

June 17	5 00	31	Bakhaus Plbg. Co.....	707 Pearl Street, Springfield, Ohio.....	Fountain Hotel, Limestone Street.
June 24	5 00	32	Wuellner & Theado. . .	691 Parsons Ave., Columbus, Ohio.....	High School, Cuyahoga Falls, Ohio.
June 26	5 00	33	H. W. Roberts.....	Urbana, Ohio	Citizens National Bank, Urbana, Ohio.
June 28	5 00	35	Bakhaus Plbg. Co.....	707 Pearl Street, Springfield, Ohio.....	Saloon, 700 E. Pleasant.
June 28	5 00	34	Bakhaus Plbg. Co.....	707 Pearl Street, Springfield, Ohio.....	Saloon, 135 W. Main Street.
July 6	5 00	36	T. M. Cunningham.....	205 S. Main Street, Marion, Ohio.....	Lincoln School, Marion, Ohio.
July 8	5 00	37	Wm. F. Koper.....	253 Vine St., Chillicothe, Ohio.....	Western School, Chillicothe.
July 10	5 00	38	Bohn & Kern.....	36 S. 3rd Street, Zanesville, Ohio.....	Inn Hotel, 5th St., south.
July 8	5 00	39	Theo. G. Scheid.....	401 Opera House, Lima, Ohio.....	Commercial Building, corner High and Union.
July 16	5 00	40	The Geo. Haucke Co.....	331 W. Main, Springfield, Ohio.....	Corner Limestone and Washington Street.
July 16	5 00	41	The Geo. Haucke Co.....	331 W. Main, Springfield, Ohio.....	Southeast corner Yellow Springs and Fair.
July 16	5 00	42	Morgan & Wood.....	135 W. Spring, Lima, Ohio.....	Store and flats, 823 E. Main Street.
July 18	5 00	43	Chas. E. Ridenour & Co.	35-37 W. Spring, Springfield, Ohio.....	Office building, Kenton Street.
July 18	5 00	44	Chas. E. Ridenour & Co.	35-37 W. Spring, Springfield, Ohio.....	Shop—Forge, Lagonda Avenue.
July 22	5 00	45	Baxter-Nafz Co.	17 N. Fountain, Springfield, Ohio.....	Commercial Building, 121 E. High Street.
July 23	5 00	46	Thompson & Sprague.....	224 Ash Street, Piqua, Ohio.....	Factory, W. Ash, Piqua, Ohio.
July 25	5 00	47	The Larsen & Wood Co.	Toledo, Ohio	Ev. Luth. School, Oak Harbor, Ohio.
July 29	5 00	48	T. E. Cox.....	Greenfield, Ohio	People's Bank, Greenfield, Ohio.
July 29	5 00	49	R. H. Desormoux & Co.	Springfield, Ohio	20 E. High Street, Springfield, Ohio.
July 29	5 00	50	R. H. Desormoux & Co.	Springfield, Ohio	Children's Home, north of Springfield.
July 30	5 00	51	John C. Hayne.....	16 S. 4th Street, Martins Ferry, Ohio.....	Central School, 4th Street.
July 31	5 00	52	Crain-Stuart Co.	Springfield, Ohio	Saloon, Fountain Ave. and Washington.
July 31	5 00	53	Chas. E. Ridenour & Co.	35-37 W. High, Springfield, Ohio.....	Lagonda Mfg. Co., 1809 Sheridan Avenue.
Aug. 1	5 00	54	H. W. Roberts.....	Urbana, Ohio	Champaign County Children's Home.
Aug. 1	5 00	55	D. J. Sweeney.....	Urbana, Ohio	Champaign County Children's Home.
Aug. 2	5 00	56	M. W. Townsend.....	Martinsville, Ohio	School, Martinsville, Ohio.
Aug. 2	5 00	57	Morgan & Wood.....	135 W. Spring, Lima, Ohio.....	Gamm-Bernstein Factory, Lima, Ohio.
Aug. 2	5 00	58	Morgan & Wood.....	135 W. Spring, Lima, Ohio.....	Whittier School, Rees Avenue.
Aug. 2	5 00	59	Morgan & Wood.....	135 W. Spring, Lima, Ohio.....	Lima Locomotive Corporation.
Aug. 5	5 00	60	Roos & Weber.....	Wapakoneta, Ohio	Store room, 48 E. Auglaize Street.
Aug. 5	5 00	61	D. W. Schneider.....	Washington C. H., Ohio.....	High School, N. North Street.
Aug. 6	5 00	62	Stephenson & Mong.....	129 N. Main, Piqua, Ohio.....	Flats, River Street, Piqua, Ohio.
Aug. 7	5 00	63	Lima Plbg. & Heat Co.....	Lima, Ohio	Mercantile, East Wayne, Lima, Ohio.
Aug. 8	5 00	64	Allen Cons. Co.	Washington C. H., Ohio.....	Frankfort, Ohio, School.

COLLECTIONS MADE BY THIS DEPARTMENT DURING THE YEAR 1912—Continued.

Date.	Amount.	Receipt No.	Paid by	Address.	For Building Located at
Aug. 9	5 00	65	J. H. Doering.....	Wapakoneta, Ohio	117 W. Auglaize, Wapakoneta, Ohio.
Aug. 10	5 00	66	D. J. Sweeney.....	Urbana, Ohio	Shop, Miami Street, Urbana, Ohio.
Aug. 12	5 00	67	Thompson & Sprague..	224 Ash Street, Piqua, Ohio	Offices, W. Green Street.
Aug. 13	5 00	68	Willard Pennell	Van Wert, Ohio.	School, Ohio City, Ohio.
Aug. 15	5 00	71	The T. B. Johns Co..	211 S. Main Street, Lima, Ohio.....	Flat, Market and Pierce.
Aug. 15	5 00	72	Conn. F. Ducey.....	Washington C. H., Ohio.....	Carnegie Library, Mt. Sterling, Ohio.
Aug. 19	5 00	76	Carey & Hall.....	Defiance, Ohio	Fulton County Infirmary.
Aug. 16	5 00	75	Martin F. Arnold.....	Hamilton, Ohio	Catholic High School.
Aug. 14	5 00	69	Baxter & Brown.....	Tiffin, Ohio	Washington and Perry Streets.
Aug. 14	5 00	70	Baxter & Brown.....	Tiffin, Ohio	Science Hall, Heidelberg University.
Aug. 19	5 00	77	Ringwald & Sons.....	42 E. 2nd Street, Chillicothe, Ohio.....	St. Mary's Catholic School.
Aug. 22	5 00	73	Orr Pblg. Co.....	Cambridge, Ohio	School, Byesville, Ohio.
Aug. 22	5 00	74	J. E. Hanley.....	Franklin, Ohio	Ohio Electric Station, Franklin.
Aug. 22	5 00	78	The T. B. Johns Co..	211 S. Main Street, Lima, Ohio.....	Garage 122 N. Elizabeth.
Aug. 22	5 00	79	The T. B. Johns Co..	211 S. Main Street, Lima, Ohio.....	450 S. Main Street, Lima, Ohio.
Aug. 28	5 00	80	Bibler Bros.	Findlay, Ohio	Central Avenue School, Findlay, Ohio.
Aug. 29	5 00	81	Schultz & Berringer...	Defiance, Ohio	Crosby Hotel.
Aug. 29	5 00	82	Staniland & Schneble..	232 S. Main Street, Dayton, Ohio.....	Montgomery County Infirmary.
Aug. 31	5 00	83	Lima Pblg. & Heat. Co.	125 E. Spring, Lima, Ohio.....	Store and flats, E. High Street.
Sept. 3	5 00	84	Kolter & Craft.....	30 W. Auglaize, Wapakoneta, Ohio.....	Elks' Lodge, W. Auglaize Street.
Sept. 5	5 00	85	DeBusman & Hennes..	178 S. Washington Street, Tiffin, Ohio	St. Paul's Church, Madison Street.
Sept. 10	5 00	86	Probst Bros.	211 E. Center Street, Marion, Ohio	Flat building, S. Main Street.
Sept. 13	5 00	87	Thompson & Sprague.	224 Ash Street, Piqua, Ohio.....	Old factory, E. Ash Street, Piqua, Ohio.
Sept. 13	5 00	88	Nunlist & Worman...	Tippencanoe City, Ohio.....	Ev. Luth. Church, Troy, Ohio.
Sept. 13	5 00	89	Barborton Pblg. Co...	Barborton, Ohio	Rose Street School, Barborton, Ohio.
Sept. 13	5 00	90	Barborton Hdw. Co...	Barborton, Ohio	Portage School, Barborton, Ohio.
Sept. 12	5 00	91	John Shontelmire	114 S. Main, Findlay, Ohio.....	Factory, Park Place and Broad.
Sept. 16	5 00	92	Morgan & Wood.....	135 W. Spring, Lima, Ohio.....	Storage, rear 207 E. Wayne Street.
Sept. 16	5 00	93	Terry McIntire	Harrod House, Lima, Ohio.....	Cafe, Waldo Hotel Building.

Sept. 17	5 00	94	Edward Crist	Circleville, Ohio	Residence and store, Circleville, Ohio.
Sept. 18	5 00	95	E. C. Humphreys & Son	Kenton, Ohio	Weaver Hotel, Kenton, Ohio.
Sept. 20	5 00	96	The J. A. Lucas Co.	249 Second St., Elyria, Ohio	Y. M. C. A., Elyria, Ohio.
Sept. 23	5 00	97	The T. B. Johns Co.	211 S. Main, Lima, Ohio	Store, 213 S. Main Street.
Sept. 23	5 00	98	Kolter & Craft	30 W. Auglaize, Wapakoneta, Ohio	Dry Goods Store, 32 E. Auglaize.
Sept. 23	5 00	99	Miller & Sode Plbg.	5th and North, Zanesville, Ohio	Church, Lexington and Indiana Streets.
Sept. 24	5 00	100	Louis B. Schaub	147 N. 3rd Street, Hamilton, Ohio	Shuler & Benninghofen Mill.
Sept. 25	5 00	101	Clifton Bros.	W. Main Street, Circleville, Ohio	Garage, 147 W. Main Street.
Sept. 26	5 00	102	Hamilton Plbg. Co.	Corner 3rd and Dayton, Hamilton, O.	Alpha Memorial House, Oxford, Ohio.
Sept. 26	5 00	103	Wuellner & Theado	691 Parsons Ave., Columbus, Ohio	St. Marys School, Martins Ferry, Ohio.
Sept. 30	5 00	104	James R. Fitton	331 33rd Street, Bellaire, Ohio	School, 46th and Harrison.
Sept. 30	5 00	105	Donlin & Smith	Middletown, Ohio	Lewis Building, 3rd Street.
Oct. 3	5 00	106	J. J. Doering	Wapakoneta, Ohio	Store and flats, E. Auglaize Street.
Oct. 5	5 00	107	Theo. G. Scheid	Mack Building, Lima, Ohio	Infirmiry, Celina, Mercer County.
Oct. 5	5 00	108	Wm. J. Spear Estate	2013 Lawrence Ave., Toledo, Ohio	Toledo Sugar Co., Rossford, Ohio.
Oct. 7	5 00	109	Theo. G. Scheid	Mack Building, Lima, Ohio	St. John's C. Church, 799 S. Main Street.
Oct. 7	5 00	110	B. F. Kuder	36 Hall Street, Tiffin, Ohio	Flat building, 136 S. Sandusky Street.
Oct. 8	5 00	111	Probst Bros.	211 E. Center Street, Marion, Ohio	Store and flats, 130 N. Main Street.
Oct. 8	5 00	112	Allen Cons. Co.	Washington C. H., Ohio	Hotel, Mt. Sterling, Ohio.
Oct. 9	5 00	113	D. W. Schneider	Washington C. H., Ohio	School, Bremen, Ohio.
Oct. 9	5 00	114	Edward Crist	Circleville, Ohio	Commercial Building, 139 E. Franklin.
Oct. 14	5 00	115	The Chas. Hoffman Co.	106 Walnut Street, Mansfield, Ohio	Store and flats, 222 N. Main Street.
Oct. 14	5 00	116	The Chas. Hoffman Co.	106 Walnut Street, Mansfield, Ohio	59-61 N. Main Street, Stores.
Oct. 17	5 00	117	The Hoffman-Conklin Co.	661 N. High Street, Columbus, Ohio	N. & W. Shops, Joyce Avenue.
Oct. 19	5 00	118	Morgan & Wood	135 W. Spring, Lima, Ohio	Bank corner Market and Public Square.
Nov. 1	5 00	119	F. H. Dougherty	209 N. Washington St., Van Wert, O.	Masonic Temple, Defiance, Ohio.
Nov. 2	5 00	120	Baxter & Brown	Tiffin, Ohio	Scientist Church, Water Street.
Nov. 2	5 00	121	The Chas. Hoffman Co.	Mansfield, Ohio	Restaurant and flats, 97-99 N. Main Street.
Nov. 4	5 00	122	Xenia Peterson	513 S. Main Street, Lima, Ohio	Mercantile Building, 1013-17 E. Spring.
Nov. 4	5 00	123	H. Fielder	Franklin, Ohio	Flats, corner 2nd and Main.
Nov. 4	5 00	124	Herboltzheimer & Howe	Westerville, Ohio	College Avenue Presbyterian Church.
Nov. 5	5 00	125	Weiss Plbg. & Heating Co.	Pittsburgh, N. S., 403 Mt. Troy Rd.	Corner Belmont and 34th, Bellaire, Ohio.
Nov. 6	5 00	126	John C. Hayne	16 N. 4th Street, Martins Ferry, Ohio	Store and flats, 5th and Walnut Streets.

COLLECTIONS MADE BY THIS DEPARTMENT DURING THE YEAR 1912—Concluded.

Date.	Amount.	Receipt No.	Paid by	Address.	For Building Located at
Nov. 11	5 00	127	The Wm. Rollenhacher Co.	Bellevue, Ohio	Eagles' Lodge and Business Block.
Nov. 14	5 00	128	The T. B. Johns Co.	211 S. Main, Lima, Ohio.	Store, E. High Street.
Nov. 14	5 00	129	Theo. G. Scheid.	Mack Building, Lima, Ohio.	Office building, W. High Street.
Nov. 19	5 00	130	Enterprise Plbg. Co.	2106 Center Ave., Pittsburgh, Pa.	City Hospital, Salem, Ohio.
Nov. 19	5 00	131	The T. B. Johns Co.	211 S. Main Street, Lima, Ohio.	German Lutheran Church, 405 E. Kibby St.
Nov. 19	5 00	132	Hildreth & Pace.	E. Church Street, Marion, Ohio.	Hall and garage, Prospect Street.
Nov. 19	5 00	133	The O. L. Boger Co.	Marion, Ohio	Hotel, W. Center Street.
Nov. 25	5 00	134	The S. A. Esswein Co.	24 W. Broad Street, Columbus, Ohio.	Railway Y. M. C. A., Bradford, Ohio.
Nov. 25	5 00	135	The S. A. Esswein Co.	24 W. Broad Street, Columbus, Ohio.	North End School, Bucyrus, Ohio.
Nov. 25	5 00	136	Morgan & Wood.	135 W. Spring, Lima, Ohio.	Flat building, corner High and Union.
Nov. 29	5 00	137	North Lima Plbg. Co.	510 N. Main Street, Lima, Ohio.	Garage, corner Main and Penna. R. R.
Nov. 27	5 00	139	The T. B. Johns Co.	211 S. Main Street, Lima, Ohio.	Flat building, 215-217 S. Pierce.
Dec. 2	5 00	138	Kolter & Craft.	Wapakoneta, Ohio	Bakery, W. Anglaize Street.
Dec. 4	5 00	140	Redman & Hollar.	16 S. 4th St., Newark, Ohio.	Maholm Street School.
Dec. 5	5 00	141	O. L. Boger Plbg. & Heating Co.	Marion, Ohio	Fire Station, S. Prospect Street.
Dec. 5	5 00	142	Lima Plbg. & Heating Co.	125 E. Spring, Lima, Ohio.	Stores and flats, 124 E. Spring.
Dec. 6	5 00	143	Eldo E. Jones	Bremen, Ohio	Old school building.
Dec. 6	5 00	144	McManus & O'Neill.	Spitzer Building, Toledo, Ohio.	Sugar Factory, Rossford, Ohio.
Dec. 7	5 00	145	Edward Flynn	60 Monroe Street, Tiffin, Ohio.	K. of C. Lodge, 49 E. Perry Street.
Dec. 9	5 00	146	J. H. Doering	Wapakoneta, Ohio	Store and flat, 1000 St. Johns Street.
Dec. 9	5 00	147	The Heimfeld Mfg. Co.	New Bremen, Ohio	Laut & Schulenberg Building.
Dec. 13	5 00	148	Wuellner & Theado.	691 Parsons Ave., Columbus, Ohio.	Grade School, East Liberty, Ohio.
Dec. 23	5 00	149	D. W. Schneider.	Washington C. H., Ohio.	Masonic Temple, S. Main Street.

OHIO STATE BOARD OF HEALTH
DEPARTMENT OF PLUMBING INSPECTION
1912 REPORT

	New Buildings Approved.	New Buildings Disapproved.	Old Buildings Approved.	Old Buildings Disapproved.	Changes Ordered.	Plans, Specifications, Approved.	Plans, Specifications, Disapproved.	First Inspection.	Second Inspection.	Final Inspection.	Certificates Issued.	Prosecutions.	Miscellaneous.	Total.	Buildings Approved, No Fees Charged.	Buildings Approved, Fees Charged.	Fees Collected.
January					1			1					2	2			\$5 00
February					2	3	3						6	8			
March			1		2	3				1	1		11	21		1	10 00
April					3	5		9					6	23			25 00
May			1	2	6	6		20	7	5	1		1	46		1	60 00
June	3				1	5		21	4	5	3		5	44		3	55 00
July	1		7		9	2		32	2	1	8		3	57		8	90 00
August					4	1		39	2				1	47			150 00
September			3		6	3		39	5	3	3		4	63	1	2	110 00
October	3		5		7			34	7	8	8			64		8	65 00
November	1		1		6	4		23	3	2	2			40		2	100 00
December					1	1		9		1			1	13			55 00
	8		18	2	45	30	3	227	30	27	26		40	428	1	25	\$725 00

RECOMMENDATIONS SUBMITTED TO THE STATE BOARD OF
HEALTH.

COLUMBUS, OHIO, October 22, 1912

DR. E. F. McCAMPBELL, *Sec'y,*
Ohio State Board of Health,
Columbus, Ohio.

DEAR SIR:—

The department of plumbing inspection desires to call the attention of the State Board of Health to several matters pertaining to the work of the department, and respectfully submits the following for your consideration:

Section 1, Ohio Building Code, makes it the duty of health departments of municipalities having health departments, to enforce the provisions of this act contained, in relation and pertaining to sanitary plumbing, but there is nothing in the law compelling local boards of health to appoint local plumbing inspectors to carry out the provisions of this act.

If we have the proper interpretation, Section 4411, General Code, gives the local boards of health the authority to appoint as many persons for sanitary duty as in its opinion the public health and sanitary condition of the corporation may require.

Section 4412 also provides that local boards of health shall have exclusive control over appointees, define their duties and fix their salaries.

In view of the foregoing, and in order to relieve this department from facing a situation wherein it will be a physical impossibility to make the inspections as required by the law, we respectfully recommend that:

“The State Board of Health recommend to the local boards of health

of the following cities, that they appoint local plumbing inspectors, and that the said boards of health establish a fee system of one dollar (\$1.00) for a permit, fifty cents (50c) for each plumbing fixture installed up to 10, and ten cents (10c) for each additional fixture."

This will create a revenue that will make the office of plumbing inspector partially, if not entirely self-sustaining.

TOWNS WITHOUT PLUMBING INSPECTION.

Hamilton	35,279	Steuenville	22,391
Lima	30,508	Tiffin	11,891
Newark	25,404	Lancaster	13,093
Zanesville	28,026	Barberton	9,401
Bellaire	12,946	Fostoria	9,579
Chillicothe	14,508	Delaware	9,076
East Liverpool	20,387	Martins Ferry	9,133
Elyria	14,825	Mt. Vernon	9,087
Findlay	14,858	Nenia	8,706
Ironton	13,147	Bellefontaine	8,238
Mansfield	20,768	Bucyrus	8,122
Marietta	12,923	Conneaut	8,319
Marion	18,232	New Philadelphia	8,542
Middletown	13,152	Niles	8,361
Piqua	13,838	Salem	8,943

Our investigation of the conditions that exist in relation to the sanitary equipment in these cities, warrants the appointment of local inspectors who are practical men.

In addition to the foregoing, we wish to call the attention of the Board, not so much to the number of inspections that are being made by the department, but to the work that is being neglected.

Our monthly reports for July, August and September show that a total of 123 inspections was made in 52 days in 68 cities, and the fees collected were \$350. With the exception of the Blind Asylum, these inspections were on installations as required by the Ohio Plumbing Laws, and it can readily be seen by these reports that some parts of the state have not been worked at all; also that your inspector spends but very little time in his office, and many who visit Columbus seeking information are disappointed.

In addition to the foregoing, we have also been informed by the consulting architects of the Building Code Commission that they expect to have the additions and revisions of the building code ready to report to the legislature early in January, and that this department is expected to furnish the amendments to Part Four, Sanitation.

We realize that it is going to be a physical impossibility for your inspector to make these inspections, furnish the Building Code Commission with a revised code and take care of the general routine work of the office, without some assistance in the way of additional inspectors.

The inspection on semi-public buildings and the smoke test in the presence of the state inspector could be waived temporarily, which would save time and travel; but the inspections of public buildings relative to the construction of the plumbing and drainage should by all means be continued.

Should the Board see their way clear to concur in the foregoing recommendations, this department still has jurisdiction over the plumbing in the public buildings of 723 municipal corporations.

In addition to the foregoing, there are

- 88 county infirmaries
- 54 district and county children's homes
- 12 state institutions
- 8 state hospitals
- 4 state universities

a total of 166 state and county institutions to be inspected, without taking into consideration the hotels, county court houses, sanitariums, schools and railroad and traction depots. The sanitary condition of the plumbing in many of the aforesaid buildings warrants immediate attention.

These matters are placed before you with the full knowledge that the Board has no appropriation to cover the expense of additional inspectors; but from our practical knowledge of the necessity that this work be continued, I would respectfully recommend that the Emergency Board be appealed to for additional funds.

Yours very truly,

[Signed]

WM. C. GROENIGER,
State Inspector of Plumbing.

COLUMBUS, OHIO, November 7th, 1912.

MR. WM. C. GROENIGER, *State Inspector of Plumbing, Columbus, Ohio.*

Dear Sir:

At a special meeting held November 5th, 1912, the State Board of Health approved that part of your recommendation relating to the recommendation of the Board that the local boards of health in the following cities be requested to appoint a plumbing inspector and, when necessary, establish a fee system in order to make the office self-sustaining: Barberton, Bellaire, Bellefontaine, Bucyrus, Chillicothe, Conneaut, Delaware, East Liverpool, Elyria, Findlay, Fostoria, Hamilton, Ironton, Lancaster, Lima, Mansfield, Marietta, Marion, Martins Ferry, Middletown, Mt. Vernon, Newark, New Philadelphia, Niles, Piqua, Salem, Steubenville, Tiffin, Xenia, and Zanesville.

The Board rejected that part of your report asking the State Board of Health to go before the Emergency Board to secure funds for the payment of salaries to additional inspectors; and directed that you devote as much of your time as is necessary in the immediate future to the satisfactory compilation of that part of the State Building Code relating to plumbing work.

Yours truly,

(Signed) E. F. McCAMPBELL

Secretary.

By order of the Board.

The authorities in the above named cities were notified, and replies were received from Fostoria, Conneaut and Salem, stating that plumbing inspectors had been appointed.

The authorities in Hamilton, Bellefontaine, Elyria and Mansfield desired further information, and the following draft of an ordinance was furnished to all of the cities included in the recommendation:

SUGGESTED DRAFT OF ORDINANCE.

Rules and regulations for the construction, alteration and inspection of plumbing and sewerage in the city of, Ohio.

Be it ordered by the Board of Health of the city of, State of Ohio, that the construction, alteration and inspection of plumbing and sewerage in or for any building in the city of shall be installed in accordance with the following rules and regulations:

Sec. 1. (License to be obtained). No person or persons, firm or corporation, shall in the city of, engage in the business of plumbing until he, it or they have obtained a license so to do from the Board of Health of the said city.

Sec. 2. (Application: bond.) Applications for license shall be made on blank forms prescribed and provided by the said Board of Health and shall be accompanied with a bond, with surety to the approval of said Board in the sum of five hundred dollars (\$500.00). Conditioned that the applicants will save said city harmless from all damage that may arise from negligence of such applicants, and that they will conform to these rules and regulations and to such other requirements as said Board may make in relation to plumbing. Licensed sewer tappers or sewer contractors will not be permitted to make connections to plumbing work. Such connections must be made by a licensed plumber.

Sec. 3. (Permit to be issued.) No plumbing work shall be done in said city, except in case of repairs or leaks, without a permit being first issued therefore by said Board of Health. Applications for permits shall be made on blank forms provided by said Board, and each application for a permit shall be accompanied with a fee of one dollar (\$1.00), and an additional charge of fifty cents (50c) for each trap or vented fixture, up to and including ten fixtures, and for each trap or vented fixture over ten a further charge of ten cents (10c) be made, to pay the expense of issuing and inspecting same, which fee shall be deposited in the treasury of said city to the credit of the health fund. A permit is required for all systems of plumbing changed from cesspool to sewer, and such plumbing systems shall be inspected and tested in such manner as will insure the efficiency of the system.

Sec. 4. (Inspector to approve plans.) No such permit shall be issued until suitable plans and a description in duplicate of the work to be

done have been submitted to the inspector of plumbing, hereinafter designated as the inspector, and have been approved by him.

Sec. 5. (When work to begin.) If the work is not begun under the approved plans within six months from the date of approval, such approval shall be deemed to have expired by limitation.

Sec. 6. (Record to be kept.) The inspector shall keep a record of all plans and descriptions submitted to him hereunder, together with his action thereon, and he shall also make a record of the plumbing in each building in the city of

Sec. 7. (Inspection.) The inspector shall be notified by the person doing same, when any plumbing work is ready for inspection. All parts of every plumbing system shall be made perfectly gas tight. All soil, waste and vent pipes when placed in position shall be tested by the water test in the presence of the inspector. All plumbing systems when completed, and before being used, shall be tested by a smoke test in the presence of the inspector, and if he is satisfied that the work is done in accordance with the laws of the state or the rules and regulations of the Board of Health, he shall issue a certificate of approval; but otherwise shall disapprove same, and said plumbing systems shall not be put to any use until they have been altered as prescribed by him, and received his approval. All plumbing work shall be left uncovered and convenient for inspection, until examined and approved by the inspector.

Sec. 8. (Permits; when required.) Permits will be required for all new work, no matter what may be its size or character, and for all work of remodeling, extension, alteration or reconstruction. Permits shall not be required for the repairing or replacing of any old fixture, faucet or valve by a new one, to be used for the same purpose; forcing out stoppage, repairing leaks or relieving frozen pipes and fittings; but such repairs or alterations shall not be construed to include cases where new vertical or horizontal lines of soil, waste, vent or interior leader or conductor pipes are used, or their relative locations changed, provided that, in a building condemned by the proper authorities because of insanitary conditions of the house drainage or plumbing, no such drainage or plumbing shall be considered as coming under the head of repairs; but all such house drainage or plumbing shall be done as in the case of new buildings, and will require a permit.

Sec. 9. (Plumbing inspector.) The Board of Health shall appoint for the purpose of the enforcement of these rules and regulations and the provisions thereof, an inspector of plumbing. Said inspector of plumbing shall be a practical plumber with at least seven (7) years' experience, selected from those persons who are well informed as to practical plumbing, skilled and well trained in matters pertaining to the sanitary regulations concerning plumbing work. The inspector so appointed shall not, during his term of office, be engaged or interested in the plumbing business or the sale of any plumbing supplies, nor shall he act

as agent, directly or indirectly, for any person or persons so engaged. The salary of the inspector shall be hundred dollars (\$) per annum, payable semi-monthly.

Sec. 10. (Rules: when apply.) The foregoing rules and regulations shall apply only to plumbing work hereafter constructed, extended or re-modeled.

Sec. 11. (Violations.) In case of the violation of the foregoing rules and regulations or any part thereof in the doing of any plumbing work, the approval of the plans and the description thereof shall be nullified by the Board of Health, and notice thereof shall at once be given to the plumbers having charge of the work and doing same, and to the owner of the building or his agent, and thereupon all work under such plans and descriptions shall immediately cease, and work thereunder shall not recommence until such plans and descriptions have been reapproved by the inspector.

Sec. 12. (Penalty; arrest and prosecution.) Failure or refusal to obey these rules and regulations will be prosecuted as provided in the General Code of Ohio.

Sec. 13. (Takes effect.) These rules and regulations shall take effect and be in force from and after ten days from the date of publication.

Adopted

.....

President Board of Health.

.....

Clerk Board of Health.

Fees Returned and Failure to Make Inspections.

In compliance with the instructions of the State Board of Health under date of November 5th, 1912:

"That the State Inspector of Plumbing devote as much time as is necessary in the immediate future to the satisfactory compilation of that part of the State Building Code relating to plumbing;"

And owing to the fact that the legislature in adopting the State Plumbing Law failed to provide sufficient inspectors to enforce the law, or to make it mandatory for local boards of health to appoint local plumbing inspectors;

And furthermore, as the sum appropriated for traveling expenses to be used by the State Inspector of Plumbing was about exhausted, it was necessary for the department to return the fees and waive the inspections on the following:

Fees.	Plumber.	City.	Location of Building.
\$5 00	Miller & Lamberson...	Montpelier	Weaver Building.
5 00	D. J. Sweeney.....	Urbana	Store, North Main St.
5 00	D. J. Sweeney.....	Urbana	Store and flat, S. Main St.
5 00	Albert Smith	Antwerp	Antwerp School.
5 00	L. P. Marshall.....	Piqua	St. John's Ev. Luth. Church.
5 00	Saml. L. Shearer.....	Zanesville	Central Presbyterian Church.
5 00	Thomas & Armstrong.	S. Charleston..	Post Office.
5 00	Porterfield Plumb. Co..	Bellaire	Commercial Building.
5 00	Kolter & Craft.....	Wapakoneta ...	Grocery.
5 00	W. G. Feichter.....	Zanesville	Church.
5 00	John Arpp	Middletown	Miami Cycle Co. factory.
5 00	J. H. Doering.....	Wapakoneta	Bakery.
\$60 00			

FIRST INSPECTIONS WAIVED.

Plumber.	City.	Location of Building.
H. W. Roberts.....	Urbana	Home Loan Building.
A. P. Rothenberger.....	Montpelier	Masonic Temple.
Justus P. & H. Co.....	East Palestine	High School.
John R. Hobensack.....	Martins Ferry	J. H. Beans Foundry.
Ashville Banking Co.....	Ashville	Bank.
Seevers & Ballett.....	Hamilton	Commercial Building.
Albert Shuler	Hamilton	Factory.

FAILURE TO MAKE FINAL INSPECTIONS.

In many instances in the following, the payment of the final estimate depends upon the certificate of approval, which cannot be issued until the inspection is made, thereby creating a hardship upon the plumbing contractor, who has followed the instructions of the law:

Plumber.	City.	Location of Building.
Allen Construction Co.....	Mt. Sterling	Tenny Hotel.
Martin D. Arnold.....	Hamilton	Catholic High School.
D. J. Sweeney.....	Urbana	Urbana Tool & Die Co.
D. J. Sweeney.....	Urbana	Humphrey Memorial School.
John C. Hayne.....	Martins Ferry	Sommers-Kuckuc Building.
Miller & Sode Plbg. Co.....	Zanesville	Brighton Pres. Church.
McManus & O'Neill.....	Rossford	Sugar Factory.
Bashore Bros.	Paulding	State Armory.
John Marquardt	Clyde	People's Bank.
Bibler Bros.	Findlay	Strothers School.
Foos & Welner.....	Wapakoneta	48 E. Auglaize St.
D. W. Schneider.....	Bremen	New School.

FEEs ACCEPTED ON THE FOLLOWING PRIOR TO THE ORDER OF
THE BOARD: INSPECTIONS REQUESTED BUT NOT MADE.

Plumber.	City.	Location of Building.
D. W. Schneider.....	Washington C. H..	Masonic Lodge Rooms.
Wm. Bollenbacher Co.....	Bellevue	Eagles Lodge and business block.
E. E. Jones.....	Bremen	School house (old).
Lima P. & H. Co.....	Lima	Store and flats, E. Spring St.
Edward Flynn	Tiffin	Knights of Columbus Lodge.
John Shontelmire	Findlay	Deisel-Wemmer Cig. factory.
J. H. Doering.....	Lima	Store and flats. 1000 St. Johns Street.
The J. A. Lucas Co.....	Elyria	Y. M. C. A.

FINAL INSPECTIONS.
Not Requested — but Necessary.

Plumber.	City.	Location of Building.
The D. A. Ebinger Co.....	Washington C. H..	Sunnyside School.
The D. A. Ebinger Co.....	Washington C. H..	East Side School.
Morgan & Wood.....	Lima	Store and flats, S. Elizabeth.
A. J. Frecka.....	Ironton	Lodge Bldg., 2nd Street.
Baxter & Brown.....	Tiffin	Heidelberg University.
The Eagan Bros. Co.....	Toledo	Country Club (River Road).
Greenewold & Lang.....	Toledo	Inverness Club (Dorr St.)
Morgan & Wood.....	Lima	Altshul Bros. Creamery.
D. W. Schneider.....	Washington C. H..	Stores (Judy Estate).
Huffman-Conklin Co.	Grandview	School (new).
Conn F. Ducey.....	Washington C. H..	Midland Grocery Co.
Saml. W. Shearer.....	Zanesville	Cons. Ten Cent Store.
The T. B. Jones Co.....	Lima	468 N. Elizabeth Street.
Delphos Hardware Co.....	Delphos	Saloon, cor. Main and 2nd.
H. W. Roberts.....	Urbana	Citizens National Bank.
T. M. Cunningham.....	Marion	Lincoln School.
Wm. F. Koper.....	Chillicothe	Western School building.
Bohn & Kern.....	Zanesville	Inn Hotel, S. 5th Street.
Morgan & Wood.....	Lima	823-825 S. Main.
Thompson & Sprague.....	Piqua	New Factory, Piqua Hosiery Co.
Laesen & Wood Co.....	Oak Harbor	Ev. Lutheran School.
T. E. Cox.....	Greenfield	People's Bank Building.
R. H. Desormoux & Co.....	Springfield	Children's Home, Clark Co.
H. W. Roberts.....	Urbana	Children's Home, Champaign County.
M. W. Townsend.....	Martinsville	School.
Morgan & Wood.....	Lima	Gramm-Bernstein Factory.
Morgan & Wood.....	Lima	Whittier School, Rees Ave.
D. W. Schneider.....	Lima	Lima Locomotive Corpora- tion.
Stephenson & Mong.....	Washington C. H..	High School, N. North St.
Lima P. & H. Co.....	Piqua	Flats, River Street.
Allen Cons. Co.....	Lima	Mercantile, E. Wayne Street.
J. H. Doering.....	Frankfort	School.
Thompson & Sprague.....	Wapakoneta	117 W. Auglaize Street.
	Piqua	Fr. Oil Mill & Machine Co.

FINAL INSPECTIONS—Continued.

Plumber.	City.	Location of Building.
Willard Pennell	Ohio City	School House.
T. B. Johns Co.	Lima	Flats, Market and Pierce Sts.
Conn F. Ducey.....	Mt. Sterling	Carnegie Library.
Carey & Hall.....	Defiance	Fulton County Infirmary.
Baxter & Brown.....	Tiffin	Cor. Washington and Perry.
Baxter & Brown.....	Tiffin	Science Hall, Heidelberg University.
The S. A. Esswein Co.....	Kent	State Normal School, Dormitory.
The S. A. Esswein Co.....	Kent	State Normal School, Adm. Bldg.
Wm. R. Ringwald & Son....	Chillicothe	St. Mary's Catholic School.
Orr Plumbing Co.....	Byesville	School.
The T. B. Johns Co.....	Lima	Garage, rear 122 N. Elizabeth.
The T. B. Johns Co.....	Lima	450 S. Main Street.
Lima P. & H. Co.....	Lima	Stores and flats, E. High St.
DeBusman & Hennes.....	Tiffin	St. Pauls M. E. Church.
The Wm. H. Conklin Co.....	Reynoldsburg	State Serum Farm.
The Wm. H. Conklin Co.....	Columbus	State School for Blind.
Probst Bros.	Marion	Flats, S. Main Street.
Thompson & Sprague.....	Piqua	Old Factory, E. Ash Street.
Nunlist & Worman.....	Troy	Ev. Lutheran Church.
Barberton Plumbing Co.....	Barberton	Rose street school.
Barberton Hardware Co.....	Barberton	Portage school, High Street.
Morgan & Wood.....	Lima	Storage, rear 207 E. Wayne
Terry McIntire	Lima	Waldo Hotel Cafe.
Edward Crist	Circleville	Store and flat, W. Main St.
E. C. Humphreys & Son....	Kenton	Weaver Hotel.
The T. B. Johns Co.....	Lima	Store, 213 S. Main Street.
Kolter & Craft.....	Wapakoneta	Store, 32 E. Auglaize Street.
Louis B. Schaub.....	Hamilton	Shuler, Benninghofen Mill.
McMullen & Son.....	Circleville	Garage, 147 W. Main Street.
Hamilton Plbg. Co.....	Oxford	Alpha Memorial House.
Donlin & Smith.....	Middletown	Lewis Bldg., 3rd Street.
Theo. G. Scheid.....	Celina	Mercer Co. Infirmary.
Wm. J. Spear Estate.....	Rossford	Sugar Factory.
Theo. G. Scheid.....	Lima	St. Johns Catholic Church.
B. F. Kuder.....	Tiffin	Flats, 136 S. Sandusky St.
Probst Bros.	Marion	130 N. Main Street.
Edward Crist	Circleville	139 E. Franklin Street.
The Chas. Hoffman Co.....	Mansfield	222-224 N. Main Street.
The Chas. Hoffman Co.....	Mansfield	59-61 N. Main Street.
The Huffman-Conklin Co.....	Columbus	N. & W. Shops, Joyce Ave.
Morgan & Wood.....	Lima	Cor. Market and Public Sq.
Baxter & Brown.....	Tiffin	First Scientist Church.
The Chas. Hoffman Co.....	Mansfield	97-99 N. Main Street.
Xenia Peterson	Lima	1013-17 E. Spring Street.
E. Fielder	Franklin	Flats, cor. 2nd and Main.
Herboltzheimer & Howe.....	Westerville	Presbyterian Church.
Weiss P. & H. Co.....	Bellaire	Cor. Belmont and 34th St.
The T. B. Johns Co.....	Lima	Store, E. High Street.
Theo. G. Scheid.....	Lima	W. High bet. Main and Elizabeth.
The T. B. Johns Co.....	Lima	German Ev. Luth. Church.
Hildreth & Pace.....	Marion	Hall and garage, Prospect St.
The S. A. Esswein Co.....	Bradford	Railway Y. M. C. A.
The S. A. Esswein Co.....	Bucyrus	South End School.
Morgan & Wood.....	Lima	N. E. Cor. High and Union.
North Lima Plbg. Co.....	Lima	Cor. Main St. and Pa. R. R.

FINAL INSPECTIONS—Concluded.

Plumber.	City.	Location of Building.
The T. B. Johns Co.....	Lima	215-217 S. Pierce Street.
	Newark	Maholm Street School.
O. L. Boger Plbg. Co.....	Marion	Fire Station, S. Prospect St.
The S. A. Esswein Co.....	Lima	Lima State Hospital.
Enterprise Plbg Co.....	Salem	City Hospital.
J. H. Doering.....	Wapakoneta	Stores and flats, E. Auglaize.
James R. Fitton.....	Bellaire	Harrison Street School.
The J. A. Lucas Co.....	Elyria	Y. M. C. A.
John Shontelmire	Findlay	Deisel-Wemmer Cig. Factory.
O. L. Boger Plbg. Co.....	Marion	Hotel, W. Center St.

RECOMMENDATIONS.

In view of the many duties devolving upon this office: the vast amount of territory to be covered: the fact that the department can be made self-sustaining: and that the state plumbing laws, coupled with competent plumbing inspection, are preventive medicine, and stand for health, economy and efficiency, I would respectfully recommend:

1st: That provision be made for one assistant and at least four deputy state inspectors, one chief clerk and two assistants.

2nd: That provision be made and the State Inspector of Plumbing be authorized to make pilot drawings and illustrations, showing the various methods of installation.

3rd: That an appropriation be allowed for tests and research, to be made in connection with the Ohio State University.

4th: That the present provision for collecting fees be amended, and a graduated fee system be established.

Respectfully submitted,

WM. C. GROENIGER,
State Inspector of Plumbing.

CITY AND VILLAGE HEALTH OFFICERS

(835)

HEALTH OFFICERS IN CITIES AND VILLAGES.

Place.	Name.
Aberdeen	Dr. A. R. Carregan
Ada	James F. Jamison
*Adamsville	Dr. W. C. Kinner
*Addyston (Sekitan P. O.)	Louis Buckwalt
Adelphia	John S. Gooden
*Adena	John Hurl
*Agosta P. O. (New Bloomington)	W. H. Carey
Akron	Dr. A. A. Kohler
Albany	Walker Neff
*Alexandria	William H. Proctor
*Alger	Sant Newland
Alliance	Dr. W. H. Burns
*Alvordton	George Pifer
Amanda	George Boerstler
*Amelia	Dr. Homer C. Behymer
Amesville	Dr. G. E. Flinn
*Amherst	Dr. Washington Foster
*Amsterdam	S. H. Carter
Andover	Wm. Shipman
*Anna	Dr. Edwin A. Steely
*Ansonia	Dr. J. C. Poling
*Antioch	Dr. D. W. Lowe
*Antwerp	Charles W. Bowland
*Apple Creek	Harry H. Wilhelm
*Arcadia	Joseph Boley
*Arcanum	Ira H. Hawes
*Archbold	August Ruiehly
*Arlington	Thomas B. Trovinger
*Arlington Heights	Wm. L. Goertemiller
Arnettville (Pitsburg P. O.)	Dr. J. O. Starr
Asheville	John Johnson
*Ashley	Dennis G. Welch
*Ashland	Dr. W. H. Roasberry
Ashtabula	Dr. A. W. Hopkins
*Athalia	C. M. Defoor
Athens	Dr. J. M. Higgins
*Athica	John A. Ritz
Avon	John R. Pipes
*Bainbridge	Dr. W. W. Davis
*Bairdstown	M. E. Carmean
Baltic	Simon P. Lower
Baltimore	N. B. Niebel
Barberton	Dr. W. A. Mansfield

* In lieu of a board of health.

Place.	Name.
Barnesville	J. W. Fowler
*Barnhill	Chas. Henderson
Basil	T. F. Basch
Batavia	Peter Ballinger
*Batesville	Caleb Mercer
Bay (North Dover P. O.)	
Beach City	Theodore F. Stamm
*Beallsville	Dr. W. S. Burcher
*Beaver	F. M. Stolling
Beaver Dam	Dr. E. C. Yingling
Bedford	Dr. W. H. Black
Bellaire	Dr. D. W. Boone
Bellbrook	John R. Whitacre
*Belle Center	W. G. Oliphant
Bellefontaine	Dr. A. J. McCracken
*Belle Valley	F. M. Dennis
*Belleville	Dr. J. W. Kelly
Bellevue	Dr. J. F. Miller
Belmont	David Pangle
Belmore	Dr. G. B. Adrian
Beloit	R. H. Oswalt
*Belpre	P. B. Richardson
Benton Ridge	Dr. R. D. Whisler
Berea	Dr. A. A. Smith
*Berlin Heights	Dr. G. W. Hine
*Bergholz	Patsy Daugherty
*Berne	J. M. Bucker
*Bethel	Fred H. Scott
*Bethesda	Dr. D. T. Phillips
*Bettsville	Henry M. Craig
Beverly	Fred H. Hart
Bexley	Daniel P. Bailey
*Blakeslee	R. F. Jones
*Blanchester	A. Titus
*Bloomdale	Dr. Chas. B. Hatfield
Bloomfield (Bloomingdale P. O.)	
*Bloomingburg	G. W. Gordon
Bloomington	E. R. Blackburn
*Bloomington (Wooster P. O.)	Prof. Jno. G. Black
Bloomville	Dr. D. W. Fellers
Bluffton	Dr. R. E. Hughson
*Bolivar	W. T. Smith
Boston (Owensville P. O.)	
*Botkins	Dr. Frederick R. McVay
Bourneville	Dr. J. A. VanWinkle
*Bowerston	R. H. Gordon
*Bowersville	J. E. Steward
Bowling Green	W. E. Avery
*Bradford	Dr. H. M. Forman
*Bradner	O. J. Mitchell
*Bratenahl	Alexis J. Imhoff

* In lieu of a board of health.

Place.	Name.
*Bremen	Dr. A. A. Bradford
*Bridgeport	Wm. H. Cox
Brilliant	Frank Barcus
*Brink Haven P. O. (Gann)	W. D. Heaton
*Brooklyn Heights	Joseph E. Richardson
*Brookside	Fred Elslager
Brooksville	B. F. Shafer
*Broughton	Eli Berrier
Bryan	R. M. Rice
*Buchtel	Will Wright
Buckeye City	F. M. Welker
*Buckland	Dr. R. W. Sharp
Bucyrus	Dr. A. H. McCrory
*Burbank	A. W. Hoffman
Burkettsville	Dr. E. L. A. Brown
*Burton	Dr. A. D. Warner
*Butler	John W. Long
*Butlerville	Z. S. Mazlott
*Byesville	B. L. Nicholson
*Cadiz	Dr. Wm. H. Lemmon
Calais	O. S. Carpenter
*Caldwell	W. L. Evans
Caledonia	Philip Meister
Cambridge	Dr. W. T. Ramsey
*Camden	Dr. Geo. W. Homsher
*Canal Dover	John J. Jurgess
*Canal Fulton	John Ronan
*Canal Winchester	Dr. J. W. Shook
Canfield	Roscoe A. Brown
Cannelsville (Dillon P. O.)	
Canton	Dr. Frank DaHinden
*Cardington	W. J. Purvis
*Carey	Joseph F. Wonder
Carlisle (Berne P. O.)	
Carroll	Dr. C. A. Barrow
Carrollton	Dr. R. E. Miller
*Casstown	Dr. Foster D. Kiser
Castine	Wirt Jenkins
Catawba	Forest Mahar
*Cecil	Dr. F. F. Demuth
Cedarville	Samuel Albright
Celina	Dr. Joseph Sager
*Centerburg	Dr. Willis O. Phillips
Centerville (Montgomery Co.)	Lester Eagle
Centerville (Gallia Co.) Thurman P. O.	
*Chagrin Falls	John W. Steever
*Chambersburg (Eureka P. O.)	Dr. W. J. Fletcher
*Chardon	Rufus Smith
*Chatfield	Samuel Lutz
Chauncey	Dr. W. V. Sprague

* In lieu of a board of health.

Place.	Name.
Chesapeake	C. E. Walters
*Chesterhill	Wm. Johnson
*Chesterville	C. W. Mather
*Cheviot (Station L. Cincinnati)	L. Scott Getzendanner
Chicago	J. H. Jefferson
*Chickasaw	John P. Kroeger
Chillicothe	Dr. W. S. Scott
Cincinnati	Dr. J. H. Landis
Circleville	Harry S. Sheets
Clarington	John E. Morrill
*Clarksburg	Floyd Noble
*Clarksville	Frank Hoggatt
Cleveland	Dr. Martin Friedrich
*Cleveland Heights	Dr. Emil H. Stone
*Cleves	Dr. Chas. W. Smedley
*Clifton	Dr. Frank C. Adams
Clinton (Fitchville P. O.)	
*Cloverdale (Drusilla P. O.)	Dr. J. E. Stephan
Clyde	Jesse Beard
*Coal Grove	Dr. Wm. Shattuck
*Coalton	James Hensley
*Coldwater	Dr. F. H. Brumm
*College Corner	C. B. Howe
*Columbiana	Dr. John F. Mellon
Columbus	Dr. Louis Kahn
*Columbus Grove	Dr. N. Seaman
*Commercial Point	Joseph Conrod
Congress	L. S. Simon,
	R. D. No. 2, West Salem
Conneaut	Dr. W. W. Wetmore
*Continental	Daniel Noe
Convoy	
*Coolville	Dr. A. E. Lawrence
Copley	
Corlett	Dr. Arthur M. Cheetham
*Corning	Wm. Anderson
Cortland	Dr. B. G. McCurley
*Corwin	C. M. Reynolds
Coshocton	Dr. F. M. Marshall
Covington	Wm. E. Westfall
Crestline	Dr. C. A. Marquart
*Creston	R. M. Ewing
Cridersville	S. DeLong
*Crooksville	Dr. Ellis I. Dozer
*Croton P. O. (Hartford)	Ed E. Shafer
*Crown City	Samuel Rouse
*Cumberland	D. T. Phelps
*Custar	Dr. Ivan L. Biggs
*Cuyahoga Falls	William W. Scupholm
*Cygnet	Dr. E. W. Misamore

* In lieu of a board of health.

Place.	Name.
*Dalton	Dr. J. Coloman Haney
Danville	Dr. T. E. Jefferson
Darbyville, (P. O., R. F. D. No. 1 Orient)	
Dayton	Dr. C. L. Patterson
*Deavertown	Dwight James
Deersville	W. C. Birney
Defiance	Dr. J. D. Westrick
*DeGraff	Thos. H. Makemson
Delaware	Dr. F. V. Miller
*Dell Roy	Dr. D. H. Schall
*Delphos	Dr. Ezra Burnett
Delta	Geo. A. Everett
Dennison	G. H. Fowler
*Deshler	M. G. Coats
*Dexter City	Benj. M. McAtee
*Dillon P. O. (Cannelsville)	Dr. Chas. A. Dunn
*Dillonvale	Matthew Allison
Donnelsville	Dr. Horace Heistand
*Dover (West Dover P. O.)	L. A. Williams
*Doylestown	F. M. DeWise
Dresden	Charles Bice
Drusilla (Cloverdale P. O.)	
*Dublin	John A. Wing
*Dunkirk	Dr. C. C. McLaughlin
*Dupont	T. R. Hart
East Cleveland	Dr. E. F. Romig
East Fairfield	Dr. G. H. Albright
*East Linden	J. H. Pember
East Liverpool	Dr. C. B. Ogden
*East Palestine	Dr. J. M. Van Fossan
*East View (Warrensville P. O.)	Charles C. Murfett
*East Youngstown	James A. Silar
*Eaton	Ora Acton
Edgerton	Dr. C. Hathaway
*Edison	Dr. Jno. H. Jackson
Edon	Ed Zwickey
Eldorado	J. M. Kimmel
Elgin	Elmer Coil
*Elida	Dr. S. A. Hitchcock
Elmore	Dr. S. T. Dromgold
Elmwood Place	Dr. E. T. Busching
Elyria	Dr. Geo. E. French
Empire	John Hunter
Enon	B. C. Hebble
*Euclid	Dr. Morris Schott
Eureka P. O. (Chambersburg)	
*Fairfield	M. W. Lasure
Fairmount (Hamlet)	H. H. Canfield, Cleveland

* In lieu of a board of health.

Place.	Name.
*Fairport (Fairport Harbor P. O.)	Matti Hietanen
*Fairview (Rocky River P. O.)	Frank Jones
*Fairview	T. W. Johnson
*Farmersville	C. M. Boomershine
*Fayette	Benj. Stoner
*Fayetteville	Henry E. Fitzpatrick
*Felicity	W. W. Hayden
*Fernbank	Daniel Newbrough
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Florida	Wm. Thompson
*Flushing	W. B. Harris
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Fort Jennings	Ferd Heising
Fort Recovery	Dr. W. C. Robeson
Fostoria	W. N. Caldwell
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*Franklin	John B. Miller
*Frazeysburg	Dr. J. D. Flemming
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Fredericktown	Dr. J. H. Norrick
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Gann (Brinkhaven P. O.)	
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*Genoa	Edward Myers
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Glenmont	J. C. Bresson
Glouster	Dr. H. G. Gibson
*Gnadenhutten	Wm. M. Hamilton
*Gordon	Dr. H. Z. Silver
*Grafton	John Bardon
Grand Rapids	G. S. Burkett

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*Granville	Dr. A. K. Follett
Gratis P. O. (Winchester) Preble Co.	Fred Boesenberg
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*Greenfield	Dr. J. D. Varney.
Greenspring	John Gallagher
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*Grove City	Chas Swartz
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*Grover Hill	T. G. Goliver
*Hamden	Albert Knox
*Hamersville	H. H. Hannah
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Hamler	William Fye
*Hanford	W. M. Schlippe
Hanging Rock	Joseph Kinkaid, Sr.
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Hanoverton	Newton Steller
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Harrison	Abe Loos
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Kingston	F. P. Long
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*Leesville P. O. (Leesburg)	W. C. Sharp
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*Linden Heights	John L. Mulligan
*Linndale	Frank Letterle
*Lindsey	Dr. E. V. Berry
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*Lowellville	Rodger Horn
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*Magnolia	P. H. Blayer
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*Martinsville	J. L. Loney
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*Mendon	Edward C. Thomas
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Miamisburg	Dr. William Shuler
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Middletown	Dr. Geo. D. Lummis
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*Mineral Ridge	Edward Plunt
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*Neville	Dr. A. D. Spence
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*New Carlisle	D. F. Akers
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*New Lebanon	Leo Duff
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North Lindale	Hugh Geariety
North Randall	Thomas J. Redmond
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*Norwich	Allen I. Mercer
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*Osborn	W. B. Morrison
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*Pandora	Dr. Noah S. Hilty
*Pataskala	Dr. Bryon B. Ashbrook
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*Piketon	S. H. Cutler
*Pioneer	W. R. Norris
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*Plainfield	Melville C. Woods
*Pleasant City	Frank Schmid
Pleasant Hill	Dr. Judson Teeter
*Pleasant Ridge	C. H. Bowlby
*Pleasantville	R. T. Parido
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*Pomeroy	Dr. L. G. Grible
Polk	
*Portage	G. R. Haight
Port Clinton	Dr. W. H. Lausten
*Port Jefferson	Dr. D. J. Cargill
Portsmouth	Dr. S. B. McKerrihan
Port Washington	Dr. F. B. Lavimore
*Port William	F. M. Strickler
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*Rogers	H. E. Byers
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*Roseville	W. H. Garrett
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Rossville (Rossburg*)	
Roswell (Tuscarawas Co.)	
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*Shreve	James H. Address
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*Silverton	Dr. A. A. Sprague
*Sinking Springs	John W. Coran
*Smithfield	Dr. A. H. Kreager

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South Newburg	Dr. A. J. Simpson
*South Point	Dr. Wm. Wilson
*South Salem	H. C. Harper
South Solon	Dr. Fred L. Wilson
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*South Zanesville	F. R. Bowers
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*Spring Valley	Dr. R. W. Smith
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Waynesfield	Amos Shockey
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*West Carrollton	Abraham Simpson
*West Dover (Dover)	L. A. Williams
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*West Union	A. S. Doak
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*Yorkshire	Charles E. Young
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Zanesville	Christian Ruof
*Zoar	

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